The MINING CONGRESS JOURNAL

DECEMBER 1936

Industry's Musketeers

Why The American Mining Congress? Why ANY association?

There are large numbers of associations all classified as "mining." Why should they exist, and why should the mining man support any or all of them?

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The Associations are the modern "Musketeers" of industry. No matter what the attack from within or without, their slogan has successfully been "one for all, and all for one." For, in the final analysis, it is the cohesiveness of an industry that protects it against undue interference.

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THE AMERICAN MINING CONGRESS

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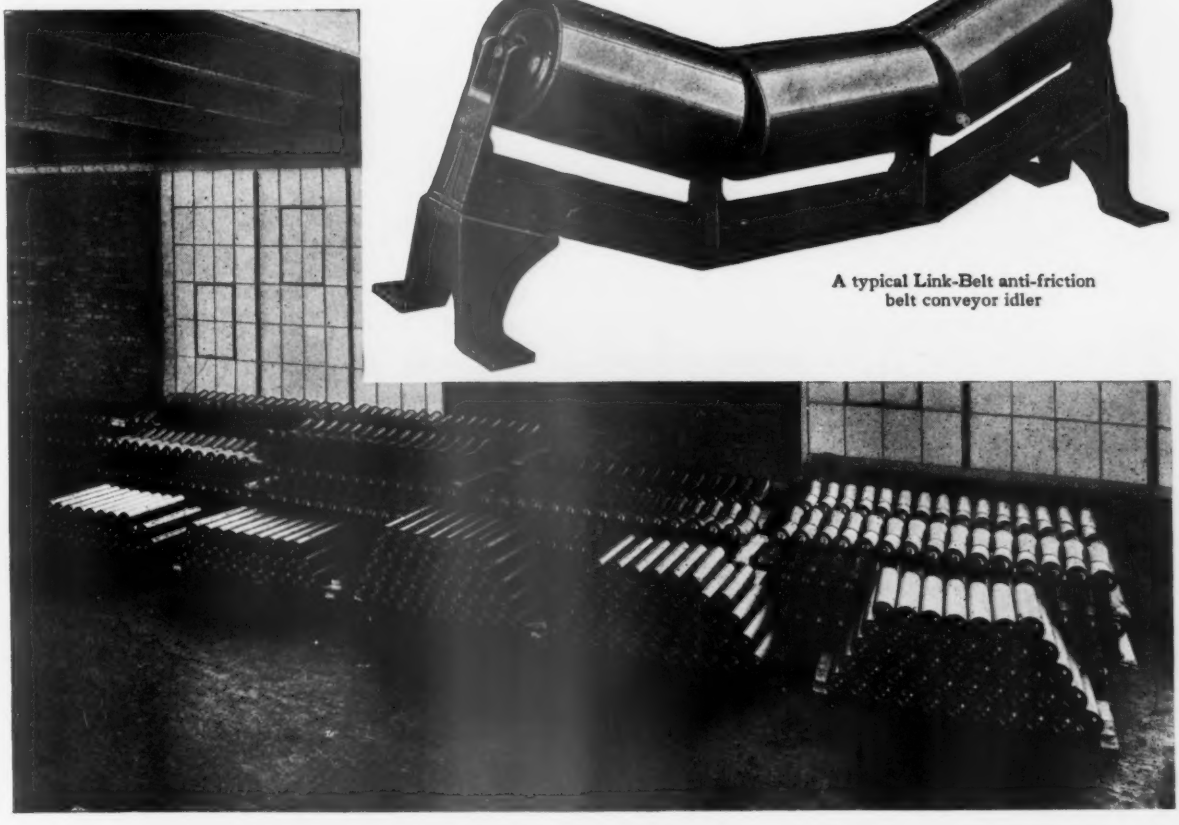

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The Mining Congress Journal

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Volume 22 DECEMBER, 1936 Number 12

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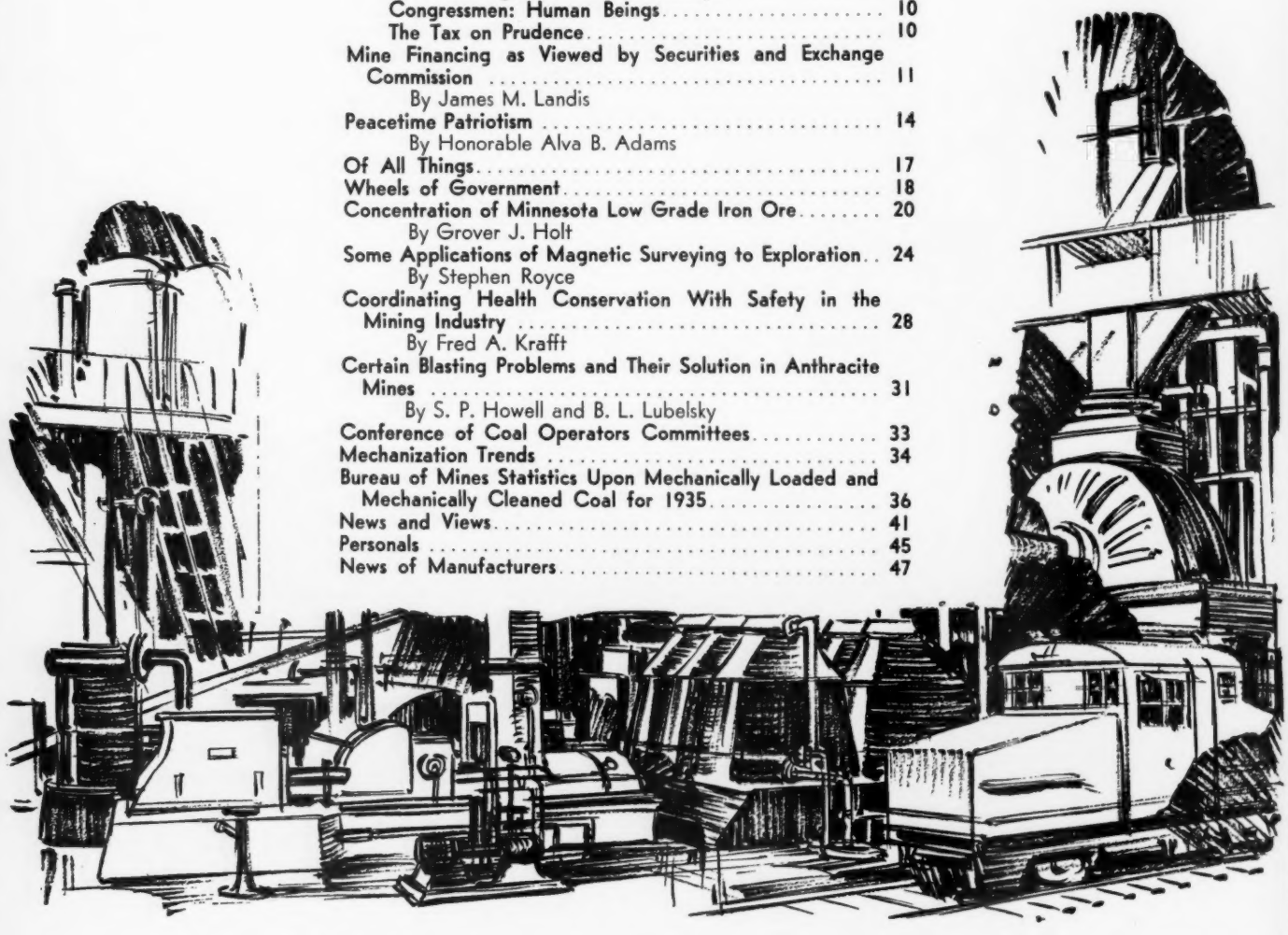

Published monthly. Yearly subscription, United States and Canada, $3.00. Foreign, $4.00. Single copies, $0.30. Entered as Second Class Mail Matter, January 30, 1915, at the Post Office at Washington, D. C.

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PROCEEDINGS ON MINE TAXATION

Present Taxation as Affecting the Mining Industry
Hon. Herbert Hoover

The Complexities of Our Tax System
Senator Wm. H. King

Administering the Revenue Act of 1936
Milton E. Carter

Taxation of Western Minerals
John T. Barnett

Practical Problems Under the 1936 Revenue Act
Henry B. Fernald

Problems in Federal Taxation and Finance
Ellsworth C. Alvord

• THE Revenue Act of 1936, with its tax on undistributed earnings, is of serious concern to all those engaged in mining.

• Federal Taxation in its relation to mines was the subject of concentrated attention at the Denver meeting. Six of the men best qualified and most intimately acquainted with these problems led the discussion.

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Wages and Price Levels

THE proposal for a "living cost" basis for wages to be adjusted to meet rising or falling price levels was promptly rejected by labor leaders. Whether this conclusion is fully justified depends largely upon the starting point.

With wages at a minimum of living requirements there could be no justice in an attempt to force earnings to a lower level. At that point production should cease until market conditions justify a return to normalcy.

A bare living wage is never a fair wage, except during the stress of a business depression which prevents all capital profits. If capital and labor can hold their own during such conditions it is all that either can expect.

Labor, in ordinary times, should have a wage, which, with economy and prudence in spending, will permit a saving to provide for the probable time of unemployment.

This is what is sought to be accomplished by unemployment insurance, which to the extent of its cost will reduce the amount of wages which can be paid. Total average wages cannot exceed total average earnings.

Wages cannot come, for any length of time, either from capital or from the earnings of capital. Wages must come from the earning power of labor.

If capital is essential to enable labor to increase that earning power, then capital must be induced by a promise of profit to assume the risks of the proposed operation.

Most large industrial enterprises had their inception in a hiring of capital by labor. When the artizan found that a bank loan would enable him to purchase machinery, through the use of which he could so increase his earning as to pay for the machinery and at the same time increase his own profits, the foundation was laid for a large industrial enterprise.

A fairer division of these profits marked the beginning of increased wage levels. Many increases were voluntarily made, but seldom in amount to satisfy.

Demands for larger pay increases were followed by strikes which in sequence led to closer association of workers and to labor organization.

Every step upward brought increased complications. These complications called for new legislation, much of which resulted in additional complication. Out of all these efforts has come legislative approval of theories apparently harmless but upon which unsound and unjust conclusions have been based.

As an illustration: "Labor is not a commodity." If true, then labor cannot be subject to the settled and accepted rules of contract.

As a practical application of this theory labor organizations have contested every effort to make them responsible. This creates unilateral contracts; contracts binding only upon the employer.

It enables organized bodies through strikes to ruin a business, to destroy capital investment and by stopping production, to punish all consumers of the articles so produced through the higher prices which follow scarcity.

These conditions again are fostered by another unsound theory, that a workman has a right to his job and therefore is justified in using force to prevent any other workman from taking his place. All of these theories are absolutely destructive of the right of collective bargaining for which so many labor battles have been fought.

Thus we have a continuing development of complications because we forsake fundamental principles. In this instance, the fundamental principle is that all wages must come from the earnings of labor and that wages and price levels must necessarily maintain a substantial relation to each other.

High wages must result in higher costs and higher price levels. High prices mean a loss of foreign markets and a decreased domestic demand.

The law of supply and demand unerringly creates an average relation between wages and price levels.

The Mining Congress Journal

Volume 22 DECEMBER, 1936 Number 12

E. R. COOMBES, Editor

A Journal for the entire mining industry published by The American Mining Congress

Our Growing Governmental Family

SINCE MARCH 1933 there have been established in the Federal Government by legislation or by Executive order, some seventy-odd new agencies to counteract the effects of the depression. Of this number there still remain in existence approximately fifty agencies. There are now 888,931 persons employed in these agencies. These figures do not include those employed in the judicial and legislative branches of the Government or the soldiers or sailors, nor do they include an employe of the Social Security Board's vast set-up. They do include, however, 54,513 persons hired under special letters of authorization in the Agricultural Department. These figures are for employes as of September 30, 1936, the annual pay roll at that date being $131,897,037.

In pre-campaign speeches the President promised a curtailment of this huge group and a definite effort looking to a decrease in expenditures and a balancing of the national budget. It is hoped that these pledges will be faithfully performed, for in spite of the fact that greater revenue is coming into the Treasury due to higher taxes and the general improvement in business, we are still spending more money than we receive.

Congressmen: Human Beings

IN A RECENT ADDRESS Senator Adams of Colorado pointed out that after all Congressional representatives are merely human beings. In their chosen line of work they wish to succeed; one way this may be achieved is by pleasing their constituents and by listening to the organized minorities who wield powerful influence in their re-election. A Senator or Congressman should represent his country as a whole first, and his particular district second. He should—and usually does desire to—represent the best interests of all the people. But he is confronted at all times with the demands of groups whose interests are purely selfish, and who have a definite say as to whether he shall continue to represent his state or district.

There is plenty of evidence that this country has been influenced too frequently by well organized minorities. As a method to combat this situation the Senator urges industry leaders to take an active interest in public affairs; to make it their business to know the kind and quality of the men who represent them; to widen their interest to cover problems other than those closely related to their own domain.

Legislators as a whole want to do the right thing; most of them definitely desire to put the future good of this country ahead of the need of the hour or the urgent demand of the few. To help them achieve this laudable ambition is the duty of every intelligent human being. The voter's responsibility does not end when his vote is cast. Industry leaders should take a greater interest in local, state, and national government and the men who have authority to legislate for them. They should spend more time in organization work. Lack of time is hardly an excuse. Chasing the horse after we forget to lock the door often consumes infinitely more time than attention in the first place. It will be well for industry to heed the Senator's advice.

The Tax on Prudence

AS THE END OF the year approaches we see tangible results of the penalty-clauses of the 1936 tax law. The aftermath of all this dividend paying and wage increase will not be evident for years to come, but anyone with an eye to the future will be able to guess fairly accurately as to the result.

There are some industrialists who see no silver lining to the present situation. Some go so far as to predict a panic within five years that will be "a panic to end all panics." Others see only inevitable industrial revolution. To those who take the more normal view the situation does not seem so dark. We are out of the depression and apparently on our way toward normal prosperity—prosperity not primed by the political pump.

Nevertheless, there is grave concern as to the consequences of the penalties of the corporation tax, for any tax that penalizes thrift or that depletes the safety factor of industry, is unwise. And the tax upon undistributed earnings definitely is an unwise provision. It penalizes the large corporation less than small capital groups. The large groups probably can withstand the penalty, but the little fellow will soon find that he is utterly unable to provide for the rainy day.

It is only sound business that any corporation may be permitted to build its safety-factor reserve; that it may provide for plant expansion; that it may modernize its properties—all of which is insurance against a repetition of the 1928-1929 fiasco.

Whatever the new Congress may propose, one thing should be rectified, and that is the penalty-clause of the revenue bill.

MINE FINANCING as Viewed by Securities and Exchange Commission†

By JAMES M. LANDIS*

THIS opportunity—to put before a group such as this some of our common problems—is for me an unusual and most welcome one. In the three and one-half years that I have had a concern with the administration of the Federal Securities Act of 1933, I have naturally had to cope with the many and complicated problems of finance that relate peculiarly to mining. We have had the aid of experts on our staff who were taken directly from the industry. We have had the help, readily given, of various professional mining groups. We have had the hearty and sincere cooperation of those members of Congress whose familiarity with the industry has sprung from long association with its practical problems. Out of these discussions have developed both our aims and our program, and this occasion affords a really unique opportunity to lay these before all of you.

In approaching the questions involved in the financing of our mining industry we must recognize at the outset that we are dealing with matters of great national significance. The problems of an industry such as this, which produced one and one-quarter billions worth of raw materials in 1935, and which ranks with agriculture as a basic industry, are truly national problems that deserve careful and sympathetic study. Furthermore, mining finance, especially in the precious and semi-precious field, possesses characteristics different from those commonly present in ordinary industrial financing. Where, in the average manufacturing industry, the problem of successfully distributing the product is integral to the problem of manufacture, in precious metal mining it plays a much lesser part. Instead, in precious metal mining, the discovery and development of a source of supply becomes paramount.

This emphasis on the continuing need for new sources of metal injects into the mining industry and its financing an element of speculation different in character than that found in other fields. Admittedly this speculative element is markedly less in the developed enterprise, but any discussion of mining finance must recognize that this speculative characteristic exists to one degree or another as a normal condition in all mining. This very fact, unfortunately, has been seized upon by unscrupulous promoters who use it as a lever for the development of their schemes. The speculative nature of mining is used as a pretext and a justification by those who promote securities rather than mines and who are ever ready to promise a pot of gold at the end of every rainbow. I cannot emphasize this fact too much, for it is of vital concern to recognize that the very characteristics of this splendid industry are such as to make it possible for men with no consciences to bring discredit upon it. And from these men we all suffered. Money, the precious lifeblood of the industry, was diverted away from legitimate investment and legitimate speculation into the pockets of those who had no concern for the welfare of the industry and who had never really sunk their roots into the territory from which they sought a livelihood.

The principles of the Securities Act of 1933 are admirably adapted to dealing with mining finance. That Act recognizes expressly that in a true sense all investment is speculative, in that its value depends on future returns and as such is subject to contingencies both known and unknown. Furthermore, following the democratic assumption that the safety of the people lies with the people, the Act says in no uncertain terms that the question as to whether any individual should part with his money for a share in an enterprise should be left to the individual. It does not insist upon particular methods of financing. It does not seek to limit promoters' profits or distribution costs. It does, however, insist that these and other known elements of the venture must be set forth clearly and unequivocally. Anything else is, and should be, at the seller's peril.

In dealing with this general question of the relationship of the Securities Act to financing, it becomes important first to describe the field in which it operates. The province of the Act is, as it constitutionally should be, that in which the mails or instrumentalities of interstate commerce are employed. But even in this field of interstate commerce, an effort is made to distinguish between problems of financing which are national in character and those which are not. The field of private financing is placed outside the province of the Act. When an individual limits his appeal for funds to a limited group of friends or associates, who presumably have not only first-hand knowledge of that individual, but also of his venture, the safeguard of mutual trust and confidence is probably better as a practical matter than any

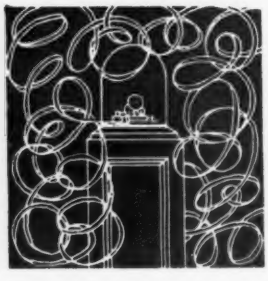
* Chairman, Securities and Exchange Commission.

† Presented to the Metal Mining Convention of Western Division, American Mining Congress, Denver, Colo., October 1, 1936.

that the law can devise. A second field, in which the application of the statute has been left to the discretion of our Commission, includes offerings of a size less than $100,000, which, because of their limited character, do not present the national problems involved in the larger-size offerings. It is only with the largest offerings, made with all the elaborateness that attends corporate offerings, through salesmen and to investors removed often thousands of miles from the state of operations, that our Commission is principally concerned. To these the mechanism of registration specified by the statute becomes applicable.

This brief summary of the scope of our statute will show you that our problem in the mining field is a two-fold one: first, to carve the exemption for the small public offering in its most practical and desirable form, and second, to fit the mechanism of registration to meet the needs of the industry. That these two questions should have been solved immediately to the satisfaction of everyone concerned was obviously too much to hope. But inasmuch as we are on the eve of projecting new solutions to both of them, and inasmuch as we seek to get the benefit of your informed judgment on the practicability and desirability of these solutions before adopting them, let me put their major outlines before you.

First, as to the exemption of the small public offering. The conditions under which it is granted today have, from our experience, shown that it is not accomplishing its purpose of being restricted to that financing which is reasonably limited from the standpoint of distribution. The type of promoter whose chief, and, perhaps, only asset is a mailing list has been seeking the shelter of these regulations. It seems to us that the promoter who seeks $100,000 or less should, if his proposition has any merit, be able to raise that amount by some means other than a high-pressure mail or salesman campaign. He should be able to raise his funds within the boundaries of a few states, and there should be little objection on his part if our sole requirement were that he comply with the state securities laws in the states in which he solicits funds. On the other hand, if the area of his solicitation is national in scope, and he seeks to solicit by the use of the mails in a dozen or more states, to require registration with the national agency seems a desirable and sensible method. In other words, the solution we suggest is this—to give an exemption in offerings of $100,000 or less in all cases where the corporation will show compliance with the state laws in the states in which it solicits funds. This obviously gives an option of a very practical kind to the corporation. If it is going to solicit funds in only a few states it may choose to qualify in these states rather than seek registration with us. If it is going to solicit throughout many states, in what will obviously be a substantial mail campaign, it will, as a practical matter, choose to register nationally rather than qualify with numerous state agencies. The idea seems to me to have much merit. It will naturally arouse opposition from those enterprises who can live only by soliciting far from home, where the truth as to their nature is unlikely to penetrate. The genuine small enterprise, speculative though it may be, should seem to me to welcome not only the practicality of thus being able to deal locally with a local problem, but also of thereby getting rid of the unfair competition of its parasitic neighbor.



Obviously, not only the success of this small public offering device, but the success of the entire program depends upon the facility with which registration can be effected. This leads me to the second problem I want to put before you.

We started with one general form of registration applicable to all industries. Not only did that form possess the inadequacies that would inhere in almost any first effort, but the differences intrinsic to various industries made for difficulties in administration that were probably as acute in the mining industry as anywhere else. Despite that fact, common sense in administration made possible its adaptation to the situations presented by the extractive industries so that since the inception of the Act roughly $125,000,000 of mine financing has been effectively registered. But the recognition that we could do better both for the mining industry and for the investor was always present, and with that in mind we prepared a new form of registration for mine financing.

Not only has a great deal of work and effort gone into this form, but, in order to avoid serious mistakes, it was submitted a short time ago to a representative list of prominent mining men, both in the east and west, for criticism. Much genuine and constructive criticism has already been offered.

Our chief concern during the past few years has been with companies engaged in gold and silver mining. Enough similarity exists, however, between these companies and base metal mines to make it possible for us to work out a single registration form covering all types of mining. But inasmuch as there is this preponderance of precious metal registrants, the form is particularly adapted to their use. Furthermore, we have concerned ourselves in this instance with the issuance of securities by companies in the promotional stage. These companies include the simon pure prospect, the semi-developed property as well as the developed property that has not yet reached the stage of actual production. Obviously, the information available with reference to these different types of companies varies, and flexibility in the amount and kind of information required must be an essential feature of any registration form. If a property is primarily speculative, the requirements cannot extend beyond insisting upon a fair and competent summary of such pertinent facts as are definitely known regarding the property, together with the opportunity to present the basis of belief regarding such development as is contemplated.

Of prime importance to investment in mining enterprises seem to be the following factors: the property, the management, the development program, including the uses to which funds will be put, the promotional features of the deal, and the costs of distribution and underwriting. These are the features which the form seeks to penetrate, and I should like to sketch briefly the ways in which it tries to do so.

In dealing with the question of the property, the attempt has been made to differentiate those mining properties where sufficient work has been done to disclose tonnages of proven or probable ore from those properties that are still relatively undeveloped. It is recognized that in properties of the first group it is possible and desirable to present the facts concerning the presence of such ore in the form of an assay map. It is also possible, where such ore has been exposed, to make an estimate of operating costs, based on available information —and no more than an estimate is asked for.

But where definite tonnages of proven or probable ore are not claimed—that is, where the property is still undeveloped—neither an assay map nor a cost estimate is asked for. Indeed, under these circumstances it might be misleading. Instead, only such customary surface and underground maps showing what development work and sampling have been done need be supplied. Generous latitude is afforded a registrant of a partially opened up property to present all facts justifying his opinion for the expenditure of funds in development. This should give ample opportunity for the raising of capital to open up resources which have not been exposed, and the certainty of which can be determined only by development.

The underlying thought back of the property questions is to eliminate statements regarding tonnages, assay values, and costs that have little if any factual basis. The registrant can tell all the facts regarding these vital points. But when definite claims are made of concrete figures of tonnage, values or costs, they must be supported by facts. On the other hand, it is recognized that funds may be legitimately sought for purely prospective undertakings, but in that event numerical estimates, which obviously cannot be supported by facts, should not be claimed.

In this attitude we have already been preceded by our friends in Canada, where

precisely the same position is taken under new rulings recently adopted by the Ontario Securities Commission; namely, that responsibility must be accepted for every statement regarding tonnages and assay values, and that competent exhibits justifying such claims must accompany every application filed with them.

The engineering exhibits that we would require are called for primarily in the case of the semi-developed and developed properties. No hardship should be involved in furnishing them, for the well-run mine possesses them already. Except under unusual circumstances, the inability to furnish such exhibits is in itself a reflection upon the management of the enterprise. As such it is a warning to an investing public that management, even though perfectly honest, is not doing an efficient job. Thus, it may well prophesy loss in what would otherwise be a sound investment.

Throughout in seeking adequate information concerning the property, for the sake of potential investors, our efforts have been bent towards getting facts that would generally seem to be available and that are intrinsic to any judgment as to the possible success of the venture. Brevity in description is desired, and undue burdens are sought to be eliminated.

In dealing with the development program, flexibility of approach seemed essential. An opportunity is afforded to set forth estimates of expenditures in stages so as to connect them logically with the development program. What is asked for is not precise, exact amounts, but the type of tentative budget that a mining engineer would set up for his client as estimates of development and equipment expense. What his client, the registrant, already has, it seems fair should be available to his new partners, the investors.

Much effort has been spent in seeking to get a short but clear story of the circumstances surrounding the promotion of the new company. Our experience in this regard tells us that frequently herein lies the test as to whether the projected enterprise is a promotion of mining or a promotion merely of stock certificates. The act does not authorize the Commission to determine what the promoters shall take for their efforts as contrasted with what the public will get for its cash contribution; the only limitation upon the promoters' rewards in so far as the act is concerned is that no false statement be made in regard thereto. Thus we do insist, and I think rightfully, that both the nature of the promoter's contribution and his compensation for it should be set forth clearly and not buried beneath an unintelligible mass of dealings between the promoter and the corporation during the stage when the corporation is but the promoter under a different name and what appears to be a bargain is nothing more than a transaction with himself. The promoter's services may be worth much or nothing at all to the corporation. The potential investor must determine that question for himself, but he should have set forth before him the basis of that bargain.

Hardly less significant as a test of the genuineness of the enterprise is the data concerning underwriting and distribution costs. How much of the money goes into the mine as contrasted with how much sticks with the security salesman en route is of the utmost importance. Furthermore, pricing also tells its story. In an undeveloped property pricing that steps up according to the quantity of securities sold without regard to any legitimate factors that enhance the value of the stock is of itself a lure and a delusion. The fair underwriting or distribution program should not have to compete with these methods, and disclosure reduces to a minimum this type of unfair competition.

In dealing with the financial history and the present financial position of a promotional venture, we have learned to realize that adequate disclosure can be obtained by a greatly simplified form and far less comprehensive schedules. Accordingly, while we retain the balance sheet, the schedules which have been required heretofore have been greatly reduced, and in place of the profit and loss statement there is required only a statement of the funds which have been available to the issuer and the uses to which they have been put.

These then are the salient features of the plan. That some ironing out will have to take place is obvious. But I believe that you can count on us to show a nontechnical, liberal temper in dealing with the problems which registration may raise. Our function is to be industrially minded. Indeed, my conception of our work is that of the conservation of our financial resources. Every dollar that we prevent from going into an illegitimate scheme is a dollar saved not only for the investor but for industry. Every illegitimate enterprise that we break up is one more blow to unfair competition, one more step in the reconstruction of the investors' confidence in business itself. We must hope that this rebuilding will follow lines free from the weaknesses which some years ago threatened the very structure itself. What those lines shall be, it is not wise to dictate. But the fundamental principle that investors should be partners in the enterprise and as such entitled to information that will let them know of what their partnership consists is essential to any sound program of corporate finance.

From the application of such a principle an industry such as yours has all to gain and nothing to lose. You and we look upon industry as a way of life, a method of enriching all those who participate in it, a genuine partnership between management and ownership. As such you seek the type of mutual trust and confidence between management and security holders that will endure through bad times as well as good. Nothing cements a bond of that character so strongly as adequate and full disclosure. Our function is the simple one of promoting ways and means of disclosure so that the investor who has placed his funds in the hands of management may know what is being done with that money. If we perform it properly, it makes your task so much easier, your cares that much less.

That realization is nothing new to the representatives of your industry with whom I have had the privilege of conferring heretofore. It is the basis upon which we have lived and worked together, interchanged ideas, and fashioned our plans. It seemed to us then that the need for an adequate exchange of information between management and the security holder increases in importance proportionately as the speculative character of an enterprise increases. Losses are always hard to take, but losses arising from undisclosed sources tend to breed not only disappointment but suspicion. The losses no human agency can avoid, but the causes for suspicion are within control. To the extent that we can remove them, we serve industry and the investor, helping to build the basis for a credit structure that will endure. And what I assume that you wish for is credit from the public on an enduring rather than a here-today-but-gone-tomorrow basis, conservation of the public's dollars for forthright investment, all at a reasonable and practical cost. That we are furthering that program by our presently contemplated steps is my hope, and my belief is that its success to the spiritual and material welfare of industry will be of greater moment than any of us can now foresee.

● THE United States Steel Corporation recently placed new orders involving an expenditure of several million dollars for the construction of mill equipment. One of the largest awards was made to the Mesta Machine Company.

● IT IS understood that metals and their allied products will be among the first large industries to be surveyed when the proposed census of unemployed gets under way. In making this announcement, Assistant Secretary Ernest Draper said: "It would be our plan to contact the leading companies in the iron, steel, and other metal fields with a view toward finding out how many unemployed there are within these industries and the possibilities of these workers being absorbed in their own field.

PEACETIME PATRIOTISM†

By THE HONORABLE ALVA B. ADAMS*

WHAT I have to say may be covered under the head of "Comments From a Layman," or, in its final analysis, perhaps we should call it "Peacetime Patriotism." That is the point to which I mean to come. I know little of mining, although my connection with it dates far back.

When the combined efforts of politics, crooked partners, and the panic of 1893 had about put an end to my schooling, a modest piece of good fortune in mining made it possible for me to continue at school. Allured by current tales of mines and miners, I had planned to become a mining engineer, but landed in the legal profession. Hoping to become a mining lawyer, I studied with much care, mining law, and the highest mark on my bar examination was in that subject, but whether—because I located in Pueblo County, where there are no mines, or for other reasons—I have had no professional business involving mining law. My present mining experience is in paying taxes each year—probably because I do not like to see my name on the tax sale list—on mining properties in a number of counties in Colorado, though I have never seen the properties and know nothing about them.

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"* * * Anyone who bets that the citizens of our country will subvert or destroy our Constitution or permit any man or group to do so will surely lose his bet. * * *"

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Recently, in reading western history, I came upon a speech delivered by Daniel Webster in the United States Senate on March 23, 1848, in reference to the Mexican War and the territory the United States had acquired or was about to acquire as a result of that war. The speech interested me greatly and perhaps you will be interested in a few quotations from it. To understand the quotations it is essential to recall that the term "New Mexico" at that time and as used by Mr. Webster included all of the Mexican cession except California, and therefore included not only New Mexico as we know it, but also Arizona, Nevada, part of Utah, and the western half of Colorado. That is, California and New Mexico as used by Mr. Webster included all the principal mining regions of the West except Montana and Idaho.

Mr. Webster said:

"As to New Mexico, its population is not likely to increase. It is a settled country; the people living along in the bottom of the valley on the sides of a little stream, a garter of land only on one side and the other, filled by coarse landholders and miserable peons. It can sustain, not only under this cultivation but under any cultivation that our American race would ever submit to, no more people than are there now. There will, then, be two Senators for 60,000 inhabitants in New Mexico to the end of our lives and to the end of the lives of our children. * * *

"I say, sir, that, according to my conscientious convictions, we are now fixing on the Constitution of the United States, and its frame of government, a monstrosity, a disfiguration, an enormity! * * *

"I cannot conceive of anything more ridiculous in itself, more absurd, and more affrontive to all sober judgment, than the cry that we are getting indemnity by the acquisition of New Mexico and California. *I hold they are not worth a dollar;* and we pay for them vast sums of money!

"Now of New Mexico, what of that? Forty-nine fiftieths, at least, of the whole of New Mexico are a barren waste, a desert plain of mountain, with no wood, no timber. Little fagots for lighting a fire are carried 30 or 40 miles on mules. There is no fall of rain there, as in temperate climates. It is Asiatic in scenery altogether: enormously high mountains, running up, some of them, 10,000 feet, with

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* United States Senator from Colorado.

† Extracts from an address before the Metal Mining Convention, Western Division, The American Mining Congress, Denver, Colo., Oct. 1, 1936.

narrow valleys at their bases, through which streams sometimes trickle along. * * *

"There is not the least thing in it to invite settlement from the fertile valley of the Mississippi. And I undertake to say, there would not be two hundred families of persons who would emigrate from the United States to New Mexico, for agricultural purposes, in 50 years. They could not live there. * * *

"In the little part which I have acted in public life, it has been my purpose to maintain the people of the United States, what the Constitution designed to make them, one people, one in interest, one in character, and one in political feeling. If we depart from that, we break it all up. What sympathy can there be between the people of Mexico and California and the inhabitants of the Valley of the Mississippi and the Eastern States in the choice of a President? Do they know the same man? Do they concur in any general constitutional principles. * * *

"I think I see a course adopted which is likely to turn the Constitution of the land into a deformed monster, into a curse rather than a blessing; in fact, a frame of an unequal government, not founded on popular representation, not founded on equality, but on the grossest inequality; and I think that this process will go on, or that there is danger that it will go on, until this Union shall fall to pieces. I resist it, today and always! Whoever falters or whoever flies, I continue the contest!"

This is but one of many instances when prophecies and predictions of doom and disaster to our country, even by able and patriotic statesmen, have been utterly repudiated and disproved by the strength and character of our people and the abundant natural richness of our country. And I venture not only to hope but to predict that current prediction of economic and political catastrophe in our country will be proven by time and events to be as false and unfounded as those of Daniel Webster in regard to the West.

Anyone who bets that the citizens of our country will subvert or destroy our Constitution, or permit any man or group to do so, will surely lose his bet.

While fur traders, explorers, and missionaries had visited and travelled over the great area which Webster declared was not worth one dollar, it was the prospector and the miner who opened up its store of riches and laid the foundation of its present greatness.

We sometimes, if not usually, forget the obligations we owe the pioneer prospector. The trails they blazed, the discoveries they made, opened the way to the thousands who followed and profited from their explorations, their labor, and hardships. I wonder how far some of the modern mining men, who go into the mountains equipped with geologist, with mining engineers, with elaborate plats, maps and surveys, and modern equipment of all sorts would get if they went into a new country without maps or guides and only equipped with a pick and a few hand tools, perhaps a little powder, a bottle of quicksilver, a pan, and a little bacon and flour, and only so much as he could carry on his back or upon the back of a plodding donkey.

Not the least of the services rendered by these pioneers was in the establishment of rough justice and the maintenance—with frontier limitations—of law and order. Paramount among the laws to be so established and enforced were those in relation to mining rights which today constitute the foundations and substance of our mining law as enacted and elaborated by legislation and decisions.

Mining is a basic industry, but its prosperity depends upon and is interlocked with all other industries and with the general prosperity and welfare. We cannot have prosperity in the mining industry—with perhaps the exception under certain conditions of gold and silver mining—in the midst of a depression. In turn, prosperity and development of the mining industry stimulates and promotes the welfare of agriculture, industry, and commerce.

Prosperity among farmers increases the purchase and use of metals. So does the prosperity of workmen, manufacturers, business men, and even bankers and financiers. The banker and financier may not use much metal in his business (except coins, safes, etc.), but when prosperous he buys automobiles, builds houses and buildings, finances industry and enterprises of many kinds, all of which use and consume metals.

It is, therefore, to the advantage of the mining industry to help and encourage all other industries.

The meetings of the American Mining Congress, bringing together the leading men in the mining industry for an exchange of views and discussions, cannot help being of great benefit to the entire industry.

The miner is not primarily engaged in a competitive business. His success is not dependent upon or affected by the success or failure of other miners. He is a primary producer of wealth. His product increases the aggregate wealth of the world. The wealth which he produces from the great hidden storehouses of nature increases and stimulates commerce and industry. The improved means of discovery, mining, and recovering metals which have been invented and developed from the experience of mining men and the studies and experiments of engineers and scientists have added tremendously to the wealth of the world, and have made most valuable and essential contributions to the marvelous development of our modern industrial age.

The general public have not given to the mining industry the credit to which it is entitled in the advancement of the world's wealth and comfort. They have thought of the miner only as the rare individual who became vastly rich

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"The general public have not given to the mining industry the credit to which it is entitled in the advancement of the world's wealth and comfort. They have thought of the miner only as the rare individual who became vastly rich through lucky stumbling upon some marvelously rich mine. * * *"

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"We forget what we get for our taxes. We get schools for our children. Our property is protected from robbery and trespass, from fire. Our health is protected from epidemic and pestilence. We and our families go to and from our work or our recreation safe from harm. We enjoy freedom of speech, of thought, or religion. We are protected from foreign invasion. We enjoy a cumulation of comforts, opportunities, liberties, such as exist in no other land. Ask those who have travelled whether they have found a better, happier, or safer land anywhere. Ask the traveller what is the greatest thrill of his trip and he will tell you (with few exceptions) that it is the sight of the Statue of Liberty in New York harbor and the first American Flag which he sees on his return. * * *"

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"If there could be an increase in the number of citizens actuated by such a genuine interest in the public welfare and if their group could be in some effective manner organized, our country and its citizenship would profit greatly. The mining industry, dependent as it is on the general prosperity way, should give more attention than it has to these matters affecting the general welfare. * * *"

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"In addition to your interest in the general business welfare, you have or should have a great concern with the personnel, policies, and activities of your government. Whether we like it or not, we live in a day of extending and expanding governmental powers and activities. * * *"

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through lucky stumbling upon some marvelously rich mine.

Mere increased production of minerals is detrimental unless consumption is increased. Increased consumption produces higher prices and increased production. The real thing for mining to do is to stimulate general business, merely trying to stimulate mining is largely futile.

In addition to your interest in the general business welfare, you have, or should have, a great concern with the personnel, policies, and activities of your Government. Whether we like it or not, we live in a day of extending and expanding governmental powers and activities.

The current political philosophy in our country imposes upon the Government many duties and functions formerly regarded as belonging to the citizen. The results of this changed theory of the proper function of government are felt in every line of business activity, including the mining industry.

The government of state or nation make many requirements such as those to insure the safety of mines and to limit the hours of work. Some of these are excessive, some inadequate—their enforcement often unfair and incompetent.

On the other hand, the Government protects your property and the proceeds from it. It builds roads (often poor). It provides schools for the children of those employed in the mines. It provides courts for the settlement of disputes. In fact, the title to your property and the right to enter and mine upon it comes from the Government, and usually upon very easy terms.

Yes! It levies taxes upon your properties and upon your income. None of us like to pay taxes. Many of us complain of our taxes as burdensome and iniquitous. We denounce the officials who levy and spend taxes as wasteful and inefficient, and sometimes say even worse things of them.

At the same time, we complain that our roads, our schools, and most public agencies should be better, we join in requests and demands for every suggested project or improvement if it is in our neighborhood. We want roads, parks, public buildings, flood protection, irrigation systems, drainage systems for both farm and mines.

So far as I know, there is no great nation in the world where taxes are not higher than here.

We forget what we get for our taxes. We get schools for our children. Our property is protected from robbery and trespass, from fire. Our health is protected from epidemic and pestilence. We and our families go to and from our work or our recreation safe from harm. We enjoy freedom of speech, of thought, or religion. We are protected from foreign invasion. We enjoy a cumulation of comforts, opportunities, liberties, such as exist in no other land. Ask those who have traveled whether they have found a better, happier, or safer land anywhere. Ask the traveler what is the greatest thrill of his trip, and he will tell you (with few exceptions) that it is the sight of the Statue of Liberty in New York harbor and the first American flag which he sees on his return.

Your taxes and the debts to be paid from future taxes have made it possible for you to sleep nights knowing that no citizen is hungry or lacks shelter in all this broad land. Of course, some of your tax money is wasted, perhaps our purposes and aims could be better accomplished by other men at less cost. However, the tax money spent to feed, clothe, and house America's unemployed may be a small price to pay for the results in public peace and safety. And remember this, bad as things are or may be, you have property and income upon which to pay taxes; you are free to live your life according to your own choice. Your land is free from the insurrection; the revolt which in other lands has overturned governments, confiscated and destroyed property. You have liberty to think and say what you please; the officials who run your Government and the policies they enforce are, in America, selected by a fair expression of public opinion at the ballot box.

Congress recently passed a tax bill imposing additional or penal taxes on undistributed incomes. This, in my opinion and that of many, as applied to earnings used in the development of a mine, a business, or to pay debts, is unsound both from the standpoint of industry and of ultimate government service. Together with some other Senators from mining states, I voted against it, and it is to be hoped that Congress will at the next session change this law. However, there has been considerable exaggeration as to the baneful effect of this tax. Probably when or if it is taken off, a part or all of the revenue expected or received from it will be raised in the way of increased taxes or earnings, whether distributed or not.

These are days of big taxes, and tomorrow will probably be a day of larger taxes.

As you are affected by all these and many other governmental activities, it is very much to your interest to exert yourselves to get and keep in public office men who are able, honest, and efficient, and who understand your problems. There seems to be a difference in intensity and degree between the attitudes of the citizen toward his country in time of war and in time of peace. When the country is confronted with the perils of war, the citizens both in public and in private life and regardless of their status in life, without hesitation, offer their services and their lives in defense of their country. They give little thought to financial consequences to themselves. Their controlling desire is to aid the nation.

Peace-time patriotism seems to be different. I have no question that in time of peace there is the same fundamental love of country, but the country being apparently no longer in distress, the citizen thinks of his own interests first, and rather unconsciously strives to see what he can get for himself out of the country. I do not mean improperly, but the citizens contemplate governmental activities in terms of their effect upon him. He joins in organized groups to put pressure on Senators and Congressmen to pass or reject measures not as they affect the country as a whole but as they affect him.

A study of the mail which comes to a Senator discloses that practically all of it is devoted to the advocacy of the personal interests of the writer.

There are many of these pressure groups crowding for their own advantage. Most of these groups are advocating steps or measures which will cost the Government money.

The member of Congress usually wishes to be reelected. He, like the private citizen, has a peace-time patriotism. He would give his life for his country in time of war, but sometimes in time of peace, under pressure from constituents he gives first consideration to his own political future. I do not mean that he thinks more of his job than he does of his country, but he does think a lot of

(*Concluded on page* 27)

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Of All Things . . .

Washington, which has more office space devoted to Governmental business than any national capital in the world, isn't large enough to house the Social Security Board's vast registration setup. . . . So over in Baltimore Uncle Sam rented 120,000 square feet of space in a building down by the docks. . . . The area needed for the intricate, expensive indexing machinery is almost as large as three football fields. . . . And right now the activities there resemble nothing so much as a hectic football game. . . .

What with the maritime strike and one thing and another, it seems like everybody is trying to get more for less. . . . But the country is safe as long as the mothers don't decide to organize into the International Amalgamated Association of Mothers and make a drive for the 30-hour week for themselves. . . .

When one stops to count the number of Republicans that will be in the Seventy-fifth Congress maybe "leftovers" would be a better term than "holdovers" at that. . . .

Well, if all those people who promised to quit politics if the election didn't go right keep their promises the election won't have been in vain. . . .

A man in Binghamton N. Y., was revived after not breathing for several minutes. . . . Maybe some one just got through telling him how much the Government costs each time we breathe. . . .

These politicians aren't so smart. . . . We'd really take our hat off to the candidate who secured the endorsement of Marie, Yvonne, Annette, Emilie and Cecile. . . .

If these old age pensions were large enough to be insurance against the temptation to risk a small stake in a crap game we'd really be getting somewhere. . . .

It seems that the fellow who is ready to poke fun at the Supreme Court never can tell you what the Court is talking about in a decision. . . .

Mrs. Roosevelt is quoted as saying that the best way a woman can keep out of politics is to stop talking. . . . Which goes to prove that women are going to remain in politics. . . .

A swell watchword for the Government would be more initiative and fewer initials. . . .

The Commerce Department was all ready to spend $345 for a camera which the lighthouse service was to use to take pictures of "general public interest and historical value." . . . The money was to come from the contingent expenditures. . . . But the general accounting office ruled that contin, at expenditures mean those that cannot be foreseen; need for a camera ought to have been forseen, and specific authority obtained from Congress for the expenditure. . . . McCarl may be gone but his spirit goes marching on. . . .

Scientists would rate a lot higher with most of the populace if they could tell us what is going to happen here and in Europe in the next few months instead of what the world will look like in 4000 A.D. . . .

Political Note: Mayor La Guardia Slated to be Next Secretary of Labor. . . . Another way of saying that "All's Quiet along the Potomac" will be gone forever. . . .

Why all this pother about the country being in danger of invasion. . . . Everybody knows that if the European nations come across it will be something they haven't done since the war debts fell due 18 years ago. . . .

The Townsend plan that makes a big hit with some people is the one being promoted in Scotland . . . $65 a month at age 200. . . .

There are no spies on WPA jobs, declares Harry Hopkins. . . . Which is something to be thankful for. . . . Imagine a modern day Nathan Hale laying down a shovel for his country. . . .

A radio speaker during the heat of the campaign referred to the Secretary of the Treasury as Henry Morgan. . . . Newspaper correspondents, anxiously waiting for Mr. Morgenthau to crack back, have come to the conclusion that he doesn't know who Mr. Morgan was either. . . .

It's a queer world all right. . . . Can you imagine Stalin's daughter marrying Hitler's son, if he had one . . . or one of Mussolini's sons working for Haile Selassie. . . . Over here a Roosevelt son-in-law becomes a Hearst publisher and a Roosevelt son is soon to become a du Pont son-in-law. . . . Now let somebody tell us it isn't a free country. . . .

Wheels of Government

A "SOBERING UP" stretch has followed the hectic campaign days, and the past month, which would quite naturally be supposed to have been devoted to a consolidation of position by the winning majority, has in fact been more of a rest period for legislators and governmental departments and agencies.

There have, of course, been and still are many rumors as to what the future holds in the way of new cabinet appointments, changes in administrative personnel, and department and agency reorganizations and re-groupings.

Since the election expressions from the White House have in the main been noncommittal, and with the President on his South American voyage, the field of planning which will affect the conduct of government for the next four years has apparently been left to his cabinet and unofficial advisers.

In the meantime, industrial management is concerned with the atmosphere which persists, indicating that there is to be some form of legislation providing a substitute for the late NRA. The Business Advisory Council, composed of industrial executives cooperating with Secretary Roper of the Department of Commerce, and with Presidential support, has held a meeting and will undoubtedly continue to study the problems of industry stabilization.

There is much talk of the O'Mahoney Federal Licensing Bill, endorsed by the American Federation of Labor and originally introduced in the first session of the Seventy-fourth Congress. This bill calls for the licensing of all corporations engaged in interstate commerce and provides that wage and hour conditions shall be negotiated through the medium of collective bargaining. Then, there are also the Major Berry conferences which are set for early December and which apparently are planned as a medium for developing group conferences between industry and labor representatives. At this time it is not apparent that there will be a representative attendance on the part of industry in the Berry conferences. The White House has mildly rebuked certain Berry activities and it would seem that the natural channel for expression on the part of industrial managements is through the Department of Commerce, which was created to advance the best interests of industrial enterprise.

Expressions are heard which indicate the feeling that there should be some form of a Federal quasi-judicial agency with the authority to give business managements a "yes or no" answer on procedure. This type of answer or advice is not to be had today either from the Federal Trade Commission or from the existing courts, unless it may possibly be said that the Declaratory Judgments Act of 1934 provides the medium. As for labor participation in the stabilization of industrial enterprise, it seems to be the considered thought of careful students of the subject that the railroads have indicated at least one way of treatment worthy of serious consideration.

The Railway Labor Act, which created the National Mediation Board as a Federal agency for mediation in matters of wages, hours and working conditions, has clearly set this phase of industrial relations apart from the field of business stabilization. There is an approach to this form of treatment in the existing situation in the bituminous coal industry, and it would seem a possibility that within this and other industries the matter of the stabilization of trade practices with proper safeguards to the consumer, could, in the future, also be handled as an enterprise apart from labor questions.

Commentators urge that the managements of business enterprise do something—take some action—before the initiative is seized by others. The feeling is expressed that unless this is done the result will be piecemeal legislation which will not contribute toward a real solution of the problems at hand.

Following closely this line of thought, the National Retail Dry Goods Association initiated the first action of its kind by any large business group, when its directors proposed the drafting of a model state law to insure satisfactory working conditions and wages, together with a model state law for the maintenance of proper relations between retailers and consumers by outlawing advertising abuses and deceptive labeling.

The month has witnessed the delivery of some 3,000,000 Social Security forms by the Post Office Department to employers throughout the country. These are the Old Age Security forms, requiring information on the number of employes, the type of business, location, etc., to be returned to the Social Security Board by November 21. Immediately afterward, the Post Office Department began the delivery of a different form, to be filled out by each worker who is eligible to benefits under the Social Security plan. The registration and assignment of a Treasury account number to each worker is expected to be completed by January 15, 1937. The 1 percent tax levied on payrolls and the similar tax on wages, the latter to be withheld and paid by the employer, begins to accrue on January 1, 1937. The tax increases ½ percent each three years, reaching a peak of 3 percent on both employer and employe by 1949.

In this connection it is of interest that the Business Advisory Council recently adopted a resolution urging all employers throughout the country to cooperate wholeheartedly with the Social Security Board and the Post Office in the Old Age Assistance registration program. The Council stated its belief that the information now being requested is essential to the proper administration of the law, and stressed the importance both to administrative authority and employers of completing the registration promptly, so that account numbers can be assigned by January 1, when the plan becomes effective.

The Third National Conference on Labor Legislation, originated three years ago by Secretary of Labor Frances Perkins, was held in Washington during the second week in November. The conference was attended by State Labor Commissioners from the various states (two governors were present), Federal experts, and many others interested in social and labor legislation. The purpose of the conference is to coordinate and press for labor legislation in the individual states. A parallel to this type of activity was the campaign carried on by the Association for Labor Legislation over a period of many years, which resulted in the establishment of Workmen's Compensation Acts covering injuries and fatalities to workmen. Today all of the states, with the exception of Mississippi and Arkansas, have such acts. The conference went on record as favoring a constitutional amendment which would permit the carrying out of the labor program for minimum wages and labor standards as to hours and working conditions.

In the make-up of the Seventy-fifth Congress, as the result of the recent elections, it is of interest to note the very unusual situation which will exist. In the Senate which would have remained Democratic in any event, there now will be 75 Democratic members, a new all-time plurality for any party. The Republicans will have 17 members; the Progressives 1 (LaFollette of Wisconsin); Farmer-Laborites 2 (Shipstead and Lundeen of Minnesota) and the In-

dependents 1 (Norris of Nebraska). The only seat lost to the Democrats was through the election of Henry Cabot Lodge, Jr., of Massachusetts. In the House the Democrats will have 334 members as compared with 315 in the Seventy-fourth Congress, and the Republicans 89.

Regulations 94, under which the Revenue Act of 1936 will be administered, have recently been made available. The book comprises 598 pages and represents intensive work by the staff of the Treasury Department. It will be remembered that on some previous revenue laws, regulations were not available until February of the following year. This year it was vitally essential that the work be completed at the earliest possible date because of the new tax on undistributed surplus. It is known to be very much the feeling of many members of the coming Congress that provision must be made for more equitable treatment of corporations which devote earnings to the reduction of debt and for development plant and equipment. The movement to remedy the hardships of the 1936 Act is steadily gaining strength. It is, however, not believed possible that the remedial provisions can be made retroactive to the taxable year 1936.

Secretary Morgenthau recently announced that the Treasury Department is conducting studies with an eye toward revision of the present capital gains and losses section of the 1936 Revenue Act. His statement was the first official confirmation of reports that the Treasury may favor relaxation of this provision at the next session of Congress. Administration and Congressional groups are also lending attention to varied suggestions for revision. Foremost among these are:

1. Liberalization of the present capital gains and losses provisions by reducing the percentage of capital gains and losses which is carried over into taxable income.
2. Segregation of net capital gains from other types of taxable income, and levying of a special flat tax or a series of low graduated rates on income derived from capital investments.
3. A combination of these two systems under which net capital gains would be segregated and taxed at special graduated rates but under which only a portion of capital gain or loss would be recognized for tax purposes, and this portion would vary with the length of time an asset has been held.

The Secretary and the Treasury Department have not indicated which course they will recommend. Informed sources are doubtful if the Treasury has definitely decided on a policy or a plan for revision of this much-criticized section.

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Senate Membership of 75th Congress

* Indicates incumbent who was reelected; D—Democrat, R—Republican, F-L—Farmer-Labor, I—Independent, P—Progressive.

STATE	ELECTED 1936	HOLDOVER
Alabama	John H. Bankhead* D	Hugo Black D
Arizona		Henry F. Ashurst D; Carl Hayden D
Arkansas	Joseph T. Robinson* D	Hattie Caraway D
California		Hiram W. Johnson R; William Gibbs McAdoo D
Colorado	Ed C. Johnson D	Alva B. Adams D
Connecticut		Augustine Lonergan D; Francis T. Maloney D
Delaware	John H. Hughes D	John G. Townsend, Jr. R
Florida	Claude Pepper D (Unexpired term ending Jan., 1939) C. D. Andrews D (unexpired term ending Jan., 1941)	
Georgia	Richard B. Russell, Jr.* D	Walter F. George D
Idaho	William E. Borah* R	James P. Pope D
Illinois	James Hamilton Lewis* D	William H. Dieterich D
Indiana		Frederick Van Nuys D; Sherman Minton D
Iowa	Clyde L. Herring D (For full six-year term) Guy Mark Gillette D (Unexpired term ending Jan., 1939)	
Kansas	Arthur Capper* R	George McGill D
Kentucky	M. M. Logan* D	Alben W. Barkley D
Louisiana	Allen J. Ellender D	John H. Overton D
Maine	Wallace H. White, Jr.* R	Frederick Hale R
Maryland		Millard E. Tydings D; George L. Radcliffe D
Massachusetts	Henry Cabot Lodge, Jr. R	David I. Walsh D
Michigan	Prentiss M. Brown D	Arthur H. Vandenberg R
Minnesota	Ernest Lundeen F-L (For full six-year term) Guy V. Howard R (For unexpired term ending Jan. 3, 1937)	
Mississippi	Pat Harrison* D	Theodore G. Bilbo D
Missouri	Bennett Champ Clark* D	Harry S. Truman D
Montana	James E. Murray* D	Burton K. Wheeler D
Nebraska	George W. Norris* I	Edward R. Burke D
Nevada		Key Pittman D; Pat McCarran D
N. Hampshire	H. Styles Bridges R	Fred H. Brown D
N. Jersey	Wm. H. Smathers D	A. Harry Moore D
N. Mexico	Carl A. Hatch* D (For full six-year term) Dennis Chavez* D (Unexpired term ending Jan., 1941)	
New York		Royal S. Copeland D; Robert F. Wagner D
N. Carolina	Josiah W. Bailey* D	Robert R. Reynolds D
N. Dakota		Lynn J. Frazier R; Gerald P. Nye R
Ohio		Robert J. Bulkley D; Vic Donahey D
Oklahoma	Josh Lee D	Elmer Thomas D
Oregon	Charles L. McNary* R	Frederick Steiwer R
Pennsylvania		James J. Davis R; Joseph F. Guffey D
Rhode Island	Theodore F. Green D	Peter G. Gerry D
S. Carolina	James F. Byrnes* D	Ellison D. Smith D
S. Dakota	W. J. Bulow* D	Peter Norbeck R
Tennessee	Nathan L. Bachman* D	Kenneth McKellar D
Texas	Morris Sheppard* D	Tom Connally D
Utah		William H. King D; Elbert D. Thomas D
Vermont		Warren R. Austin R; Ernest W. Gibson R
Virginia	Carter Glass* D	Harry Flood Byrd D
Washington		Homer T. Bone D; Lewis B. Schwellenbach D
W. Virginia	Matthew M. Neely* D	Rush D. Holt D
Wisconsin		Robert M. LaFollette, Jr. P; F. Ryan Duffy D
Wyoming	Harry H. Schwartz D	Joseph C. O'Mahoney D

SENATE: Democrats 75, Republicans 17, Farmer-Laborites 2, Progressive 1, Independent 1.
HOUSE: Democrats 334, Republicans 89, Progressives 7, Farmer-Laborites 5.

(Compiled by Congressional Intelligence)

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Concentration of Minnesota Low Grade Iron Ore

By GROVER J. HOLT*

IRON ores are produced from three areas within the State of Minnesota: namely the Vermillion, Mesabi, and Cuyuna Iron Ranges. The ores from these three ranges vary in structure and analysis, but any discussion of concentration applied to iron ore is limited almost entirely to the Mesabi Range ores. This range furnishes practically all of the wash ore produced at the present time and contains the main source of concentratible ores for the future.

The iron ores of the state may be placed in three general classes as follows:

1. *Merchantable ores* are those ores which are shipped without treatment, other than possibly some crushing or the removal of a small portion of coarse rock by means of grizzlies or screens.

2. *Wash ores* although generally placed in one group requiring concentration before shipment, should actually be divided into, A. *Straight wash ores* containing coarse iron and fine free silica, B. *Low grade wash ores* containing coarse iron, a portion of the silica free and finely divided and the balance of the silica in the form of rock intermingled with the iron oxides.

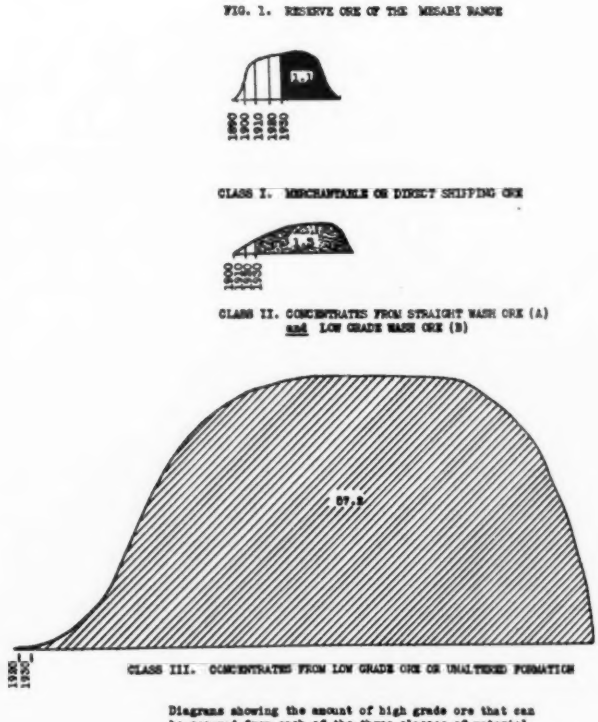
3. *Low grade ores* made up of unaltered formation with the iron oxides and rock finely disseminated throughout the mass. On the eastern end of the Mesabi Range, these oxides are in the form of natural magnetites but elsewhere occur as hematites.

To obtain a picture of production in the past and reserves for the future of each class of ore, Figure 1 is presented. It will be readily seen that wash ores and low grade ores must be looked to for production in future years as the high grade merchantable ores are exhausted.

The ore reserve figures reveal the importance of iron ore concentration to the industry in the state showing 1,100,000,000 tons of merchantable ore, 1,300,000,000 tons of both classes of wash ores, and 57,300,000,000 tons of low grade ores. The life of the merchantable ore has been estimated at 25 years under nominal increase in production.

A typical cross section of a Mesabi Range wash ore deposit is shown in Figure 2 to aid in visualizing the changes in the problem of iron ore concentration.

FIG. 1. RESERVE ORE OF THE MESABI RANGE


1900
1905
1910
1915
1920
CLASS I. MERCHANTABLE OR DIRECT SHIPPING ORE
CLASS II. CONCENTRATES FROM STRAIGHT WASH ORE (A) and LOW GRADE WASH ORE (B)
57,3
CLASS III. CONCENTRATES FROM LOW GRADE ORE OR UNALTERED FORMATION

Diagrams showing the amount of high grade ore that can be secured from each of the three classes of material. Figures show potential reserves in billions of tons.

The usual occurrence of ores in wash ore deposits, from top to bottom are merchantable ores, straight wash ores, and low grade wash ores. Individual deposits of course vary in the relative quantities of merchantable and wash ores found, some containing little if any merchantable ore, others containing larger or smaller quantities of straight wash ores (A) and low grade wash ores (B).

There is no distinct dividing line or changes in strata between straight wash ores and low grade wash ores but usually an intermingling causing decreased recoveries as mining progresses. Figure 3 shows the washing plant history of a typical group of Western Mesabi wash ore properties over a 15-year period. Decreasing recoveries with the need for a change in concentrating equipment and practice is strongly indicated.

The concentration of straight wash ores is comparatively simple, since the finely divided silica can readily be removed from the coarse iron oxides by the turbulent action of the log washer and bowl classifier. Here the separation

* Mining engineer, Butler Brothers.

depends more on particle size than on the difference in specific gravity between the iron and silica. Figure 4 shows the comparatively simple flow sheet required in a plant of this type.

As mining progresses into the low grade wash ore zone, the necessity for a change in concentration practice becomes evident due to decreasing recoveries and increasing content of silica in the concentrates. The state Mines Experimental Station under the direction of Mr. E. W. Davis, together with the research department of the mine operators have cooperated in developing flow sheets to overcome these changes in the structure of the ore. Figure 5 shows the flow sheet of a typical Mesabi concentration plant working on low grade wash ores. The old familiar straight wash flow sheet for the removal of finely divided silica is still in evidence combined with the necessary jig and Rheolaveur units to effect a separation on the basis of specific gravity.

The necessity of close sizing before jigging involving the use of a great deal of crushing and screening equipment is shown. Rheolaveur units have been adopted from coal washing practice to effect a separation on fine ore. All of these additions have necessarily increased the cost of production.

Recoveries from the group of properties shown in Figure 3 however continued to fall even after the installation of jigs and Rheolaveur units in 1929. Silica content of the concentrates also increased to a point making the blending of this ore with higher grade ore necessary.

In an attempt to overcome this drop in recovery and to work out some method of treatment of the great reserve of low grade ore, Mr. E. W. Davis and the staff of the Mines Experimental Station have developed a new shaft type of furnace for the roasting of hematite to magnetite.

This furnace has proven to be the most efficient known today for this purpose and at present the entire operation is carried out by means of fuel oil but can be operated by means of natural gas when and if available. The furnace operation is divided into zones known as drying, heating, reduction, and quenching zones, all of these operations being carried out in regular order from the top to bottom of the furnace.

It was found that a separation of material on three mesh was necessary for proper furnace operations, to avoid resistance to gas travel through the mass. The plus three mesh material enters the top of the furnace, is dried and heated to about 800° C. before mixing with the minus three mesh material. The heated coarse material gives up a portion of its heat to the finer material drying and heating it until a temperature balance of about 525° C. is reached throughout the descending ore column. This temperature being about the ideal for reduction from hematite to magnetite. The coarse and fine ore are mixed by an ingenius baffle arrangement prior to reaching the reduction zone.

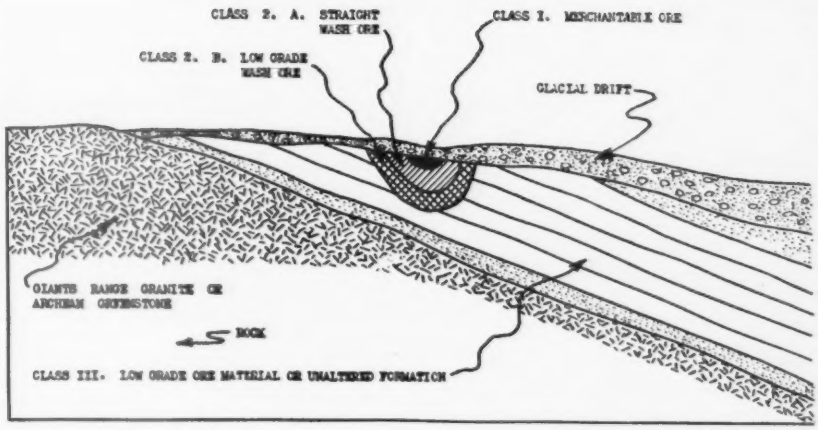

CLASS 2. A. STRAIGHT WASH ORE
CLASS I. MERCHANTABLE ORE
CLASS 2. B. LOW GRADE WASH ORE
GLACIAL DRIFT
GIANTS RANGE GRANITE OR ARCHEAN GREENSTONE
ROCK
CLASS III. LOW GRADE ORE MATERIAL OR UNALTERED FORMATION

Figure 2—Typical Cross Section of a Mesabi Wash Ore Deposit

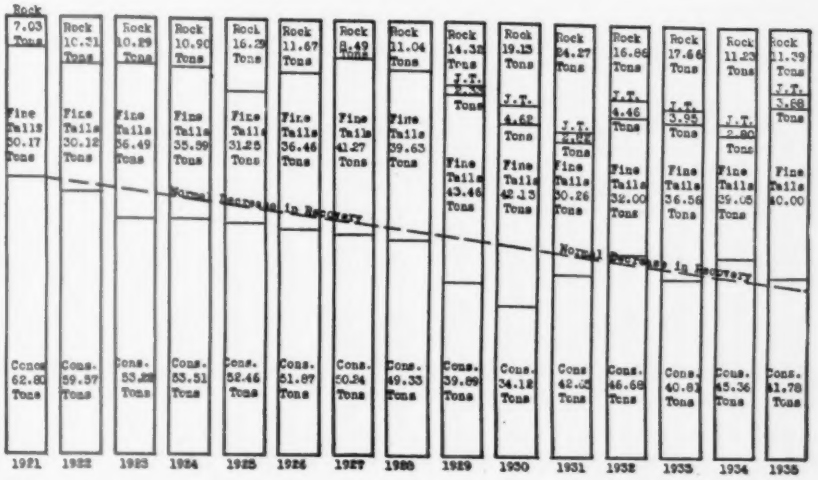


Figure 3—Chart showing decrease in recoveries over a 15-year period obtained from a typical group of Mesabi Wash Ore properties

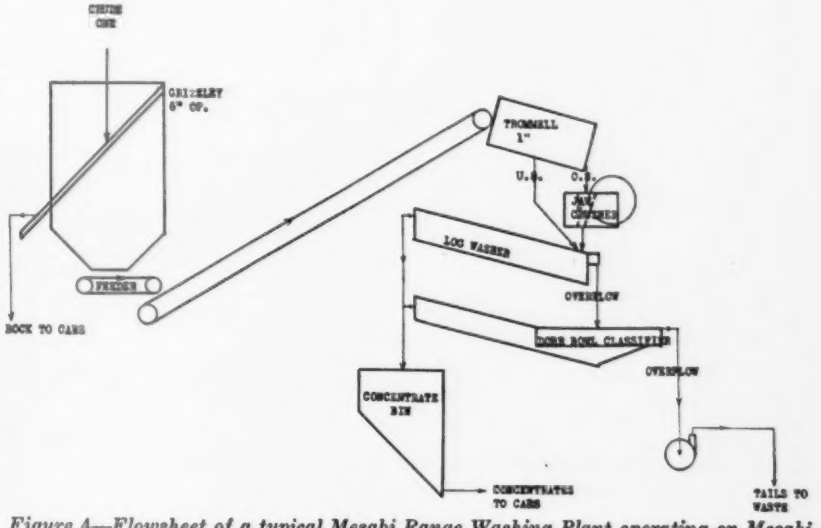


Figure 4—Flowsheet of a typical Mesabi Range Washing Plant operating on Mesabi straight wash ores

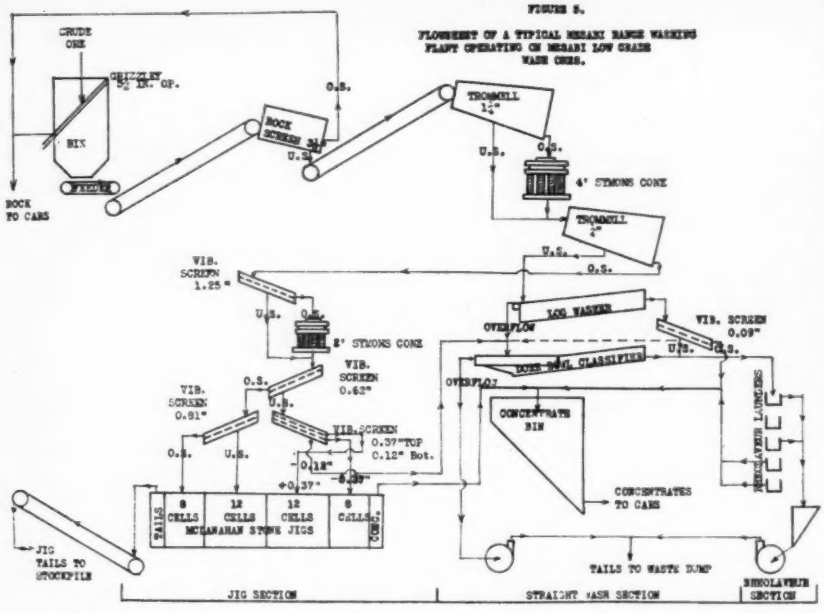


FIGURE 5.

FLOWSHEET OF A TYPICAL MESABI RANGE WASHING PLANT OPERATING ON MESABI LOW GRADE WASH ORES.

Reduction is accomplished by means of vaporized fuel oil injected into the lower portion of the furnace and the ore held in a reducing atmosphere until quenched in water at the bottom of the furnace.

This quenching action produces a large quantity of low pressure super heated steam, a portion of which is utilized in vaporizing the fuel oil for reduction. Any unconsumed reduction gas is withdrawn, washed, and injected into the combustion chamber to be consumed with the atomized fuel oil used for heating. This enables the use of an excess of reduction gas without waste.

The magnetic separation is carried out by cobbers as shown in the flow sheet in Figure 6. These cobbers contain rotating drums operating partially under water and having a series of electromagnetic coils inside the drums. These electromagnets reverse polarity several times per rotation causing a shifting of the ore particles to enable the removal of gangue material.

The degree of concentration of these cobbers is regulated by adjusting the strength of the magnetic field.

The magnetic concentrate contains fine and coarse magnetite which must be demagnetized by passing through an electrically operated demagnetizing tube. If this concentrate is not demagnetized the concentrate particles adhere to each other making it impossible to grade this material with other ores.

This magnetic unit is at present fed tailings from a concentration plant working on low grade wash ore. These tailings being a waste product carry no portion of the mining cost. The process shows signs of success on this waste material but should a mining cost be chargeable to the feed the problem would become one of economics rather than metallurgy.

Concentrating tables were used with an unclassified feed with little success years ago and were consequently discarded. Tests on properly classified feed, however, have shown good results on some ores and tables may be used in the future. The low capacity on sized feed, especially in the smaller sizes is the greatest drawback to table operation.

Flotation has been attempted in laboratory experiments but to date has not proven successful.

All of the preceding discussion on concentration has dealt only with the straight and low grade wash ores; since to date the treatment of the low grade ores of Minnesota remains to be solved. The success in treatment of this vast reserve lies in solving the problem of economics rather than metallurgy. The eastern Mesabi low grade magnetites have been successfully concentrated by means of fine crushing and magnetic separation. The western Mesabi hematites will respond to the same treatment provided they are roasted to magnetite prior to magnetic separation. No other process has as yet proven successful from a metallurgical standpoint. The ultimate treatment of low grade ores must await the time when iron ore will command a higher price than at present.

In considering iron ore concentration it must be remembered that the concentrate produced is one of low value and any concentration process to be successful must involve a low cost per ton produced. To bring out this point, the value of standard non-bessemer ore (51.50 natural iron content) is shown below:

Base value per ton at Lower Lake Ports		$4.50
Less Lake freight (vessel)	$ .83	
Less Upper Late freight (Rail)	.91*	
Total freight	$1.74	1.74
Net value per ton at the mine		$2.76

* Does not include present surcharge.

Of the published market price f.o.b. lower lake port, the mine operator receives only 61.33 percent and transportation consumes 38.67 percent.

Out of 61.33 percent of the published market value, the operator must pay mining and washing costs, royalty, taxes, and if possible establish a reserve to build new plants to meet changing ore characteristics. Transportation cost directly affects the f.o.b. mine value of the ore, due to the fact that the base value is computed at lower lake ports.

Figure 7 shows the trend of iron ore values and upper lake rail freights since

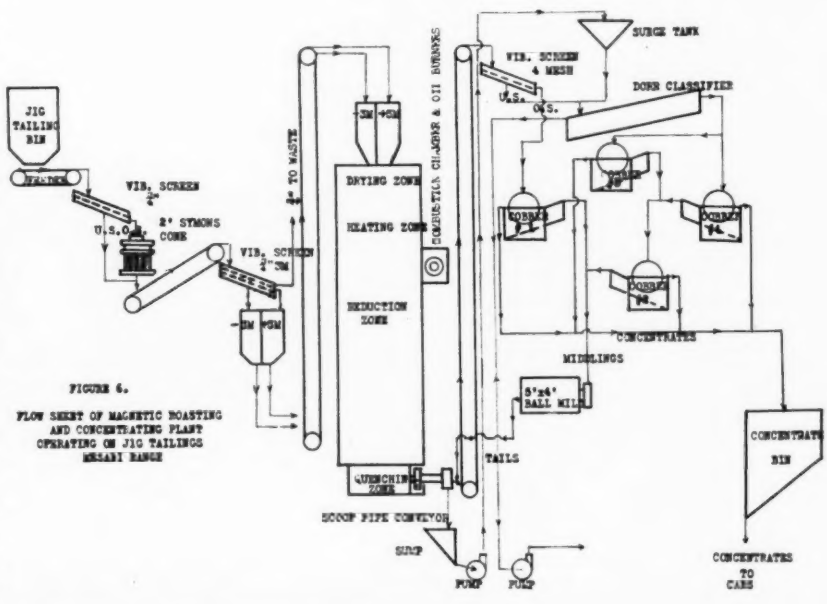


FIGURE 6.

FLOW SHEET OF MAGNETIC ROASTING AND CONCENTRATING PLANT OPERATING ON JIG TAILINGS MESABI RANGE

FIGURE 7

FLUCTUATIONS IN WEIGHTED AVERAGE VALUE F.O.B. MINE OF LAKE SUPERIOR IRON ORE AND WEIGHTED AVERAGE FREIGHT RATE FROM MINES TO UPPER LAKE PORTS
YEARS 1913 - 1936

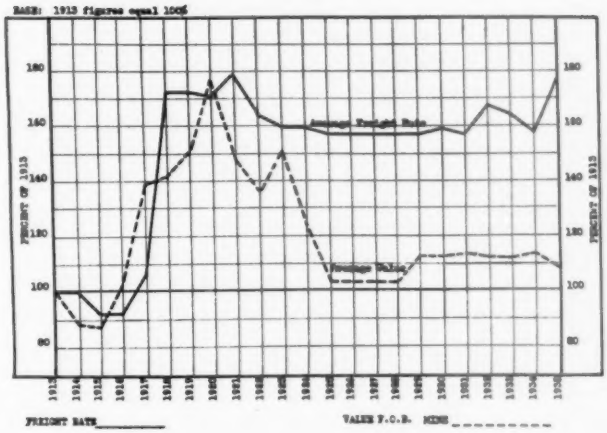
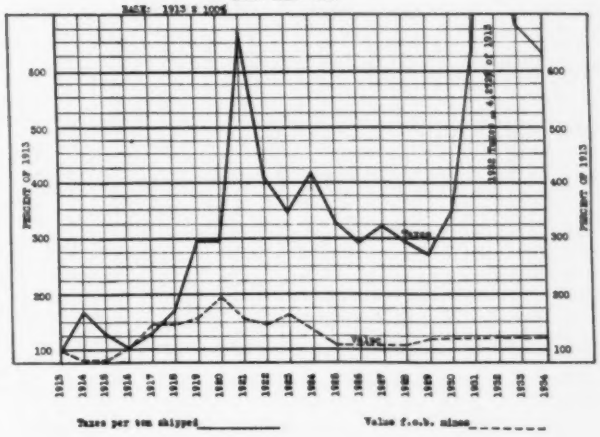


FIGURE 8

FLUCTUATION IN TAXES LEVIED IN MINNESOTA PER TON OF ORE SHIPPED AND VALUE PER TON OF STANDARD MESABA NON-BESSEMER ORE F.O.B. MINES
YEARS 1913 - 1934



1913. It will be noted that the failure of railroads to reduce their rates has in effect caused a reduction in mine value of iron ore, regardless of published market price.

Rail rates must be reduced to stimulate low-grade wash ore and low-grade ore production within the state.

The present system of taxation used by the state offers no encouragement towards the development of low-grade ores. Once a mine is placed in production, an ad valorem tax (tax on ore reserves) is imposed, together with an occupational tax figured as six per cent of the difference between mine value of the ore and certain allowed production costs. The entire cost of production is not allowed. A tax on royalties paid to the property owner is also imposed, and these in most cases revert to the operator. The fallacy of such a tax system, especially the ad valorem tax, which furnishes the bulk of the tax on iron ore, is shown in Figure 8. Here is shown the fluctuation between the total taxes paid per ton of ore shipped and the per ton value. During the last 10 years this total tax has varied from .465 to $7.348 per ton of ore shipped from the state.

The confiscation of corporation surplus by a Federal tax will not only stifle low grade ore production, but from the decreasing recoveries encountered in wash ore pits as shown in Figure 3, operators of these pits will be faced with the necessity of change in plant and equipment without adequate reserves for financing these changes.

A revamping of the entire tax system is necessary to encourage the concentration of the vast reserve of low-grade ores.

Royalties paid to the property owners per ton of ore shipped do not make sufficient provision for variation in recovery of the lower-grade ores. These royalties must be adjusted downward in the case of the low recovery ores, to furnish an incentive to the operator to develop these ores.

One general conclusion will be reached by anyone making a study of the future development of Minnesota's iron ore reserves, namely that the low-grade wash ores and low-grade ores must be brought into full production before the high-grade ores of the state are exhausted. The high-grade ores are necessary for blending with the concentrates produced from the lower-grade ores. With the most efficient processes known today, these lower-grade ores produce a concentrate too high in silica content to be suitable for present-day furnace practice.

In order to allow the operator to concentrate these lower-grade ores at even a slight profit, so necessary to the development of any industry, the cost beyond the control of the operator, such as transportation, taxes, and royalty, must be reduced.

Figures 1 and 2 were prepared by Mr. E. W. Davis, superintendent of the Mines Experiment Station, University of Minnesota.

● THE first test case of unemployment features of the Federal Social Security Act was argued before a Federal court in Boston, Mass. The court (Judge George C. Sweeney) took the case under advisement and indicated a decision would be handed down before December 15. Differing from the test of the New York State unemployment compensation law which the Supreme Court upheld a week ago, the Boston case is a direct test of the Federal act. The plaintiff, a stockholder of the Boston & Maine Railroad, sought an injunction to prevent the railroad from paying the Federal tax for unemployment compensation. The Government, which took part as a "friend of the court," was represented by Charles E. Wyzanski, an assistant attorney general, who appeared in behalf of the Commissioner of Internal Revenue. Both sides said at the conclusion of the argument that an appeal would be made to the Circuit Court and the Supreme Court in the event of unfavorable rulings. The same stockholder is also a plaintiff in another action attacking the validity of both the unemployment compensation and old age taxes, this time as a security holder of the Edison Electric Illuminating Co. In the latter case briefs are due to be filed December 19, following which the case will be argued. Counsel for the plaintiff in the first case contended that an excise tax should apply only to tangibles and not to the relationship between employer and employe. He further argued that even if the tax were found valid as an excise, it would not be uniform in that it would be levied against employers of only half of the gainfully employed persons in the country. The further contention was made that the tax was not for the purpose of raising revenue but rather to force the states to legislate as desired by the National Government.

● MINES of the Eastern States yielded metals in 1935 valued at $18,308,036, compared with $17,064,462 in 1934, while those of the Central States had a yield valued at $33,655,781 in 1935, against $26,400,506 in 1934. There were increases in production of gold, copper, lead, and zinc in the Eastern States in 1935 and a decrease in the output of silver. In the Central States silver, copper, lead, and zinc showed increases in output over 1934. There was no reported production of gold in the Central States in 1935. The output of gold in the Eastern States in 1935 amounted to 9,490.66 fine oz., and 83,975 fine oz. of silver, 20,813,111 lb. of copper, 4,982 short tons of lead, and 158,260 short tons of zinc were produced. In the Central States in 1935 the output was 117,917 fine oz. of silver, 64,176,349 lb. of copper, 132,682 short tons of lead, and 200,339 short tons of zinc.

Some Applications of Magnetic Surveying to Exploration

By STEPHEN ROYCE*

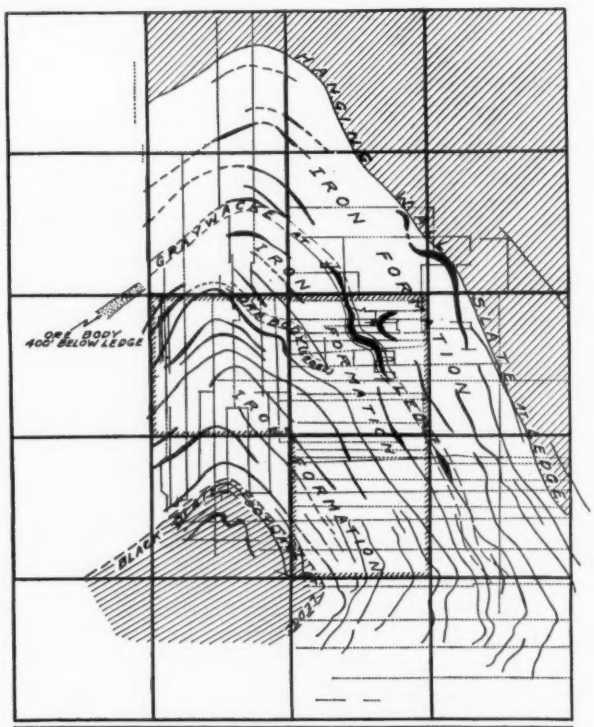
THE purpose of the present paper is to show a few specialized applications of magnetic work on the Lake Superior iron ranges. These applications include, in addition to the common dip needle, the more sensitive type of instruments such as the *Hotchkiss superdip and the magnetometer.*

There have been many exhaustive mathematical analyses of magnetic surveying phenomena and instruments published, to which the present paper makes no attempt to add. Many of these mathematical studies are more adapted to the search for bodies of magnetite ore, such as those of Sweden and the Adirondacks, than they are to Lake Superior hematite iron ores. The present discussion aims to present graphic illustrations of the magnetic pictures presented by various Lake Superior formations, with some general comments on their interpretation and use in exploration. The examples cited are from work under the writer's direction.

The common dip needle achieved a wide degree of usefulness in the early exploration of the Lake Superior iron ranges. Its early use was with the idea that iron ore would itself attract the magnetic needle. A few early successes in this line were followed by disappointing results when the attempt was made to spread the method to a general search for iron ore bodies. With the exception of much of the hard ore horizon of the Marquette range, Lake Superior iron ores are nearly all non-magnetic as far as the common dip needle is concerned. In fact, they are usually less magnetic than the surrounding rocks.

Certain of the iron formations in which the ore bodies are located have weak to moderately strong magnetic horizons within the iron formation or parallel to it in its enclosing rocks. The persistency and strength of these magnetic horizons varies widely from district to district. Only the stronger of these horizons can be traced successfully for any material distance with the common dip needle. The more sensitive instruments now available, such as the Hotchkiss superdip and the magnetometer, can trace such magnetic horizons where no positive evidence of them appears on the *common dip needle* at all.

As soon as the more sensitive instruments are used, many weak magnetics manifest their presence. These weaker magnetics are usually discontinuous and are often unconnected with iron formation. When the present sensitive types of instruments first became available, a new technique had to be developed in interpreting the weaker and more numerous magnetic anomalies that showed up with the new instruments. There are



MAP SHOWING APPLICATION OF SUPERDIP SURVEY IN TRACING AN ORE HORIZON IN FOLDED IRON FORMATION

Magnetic Horizons — Boundary of Explored Land

FIGURE 1

* Mining engineer and geologist, Crystal Falls, Mich.

three methods most commonly used for the plotting of magnetic anomalies. These are by profiles, by contours, and by drawing lines on the map connecting the magnetic peaks on adjacent magnetic traverse lines. A useful modification of this last method of plotting is to vary the weight of the magnetic lines as plotted on the map in proportion to the strength of the magnetic anomalies along these lines. It is usually not necessary to use any great accuracy in plotting the strength of these magnetic lines but merely to vary the width of the ink a noticeable amount between the weaker and the stronger lines.

Certain generalizations have been found to apply over considerable areas in Michigan. The older, or Middle Huronian, iron formation is usually more persistently and uniformly magnetic than is the younger, or Upper Huronian. The individual magnetic horizons in the older iron formation extend for longer distances than is true of the Upper Huronian, or younger, iron formation. In the latter iron formation, the magnetics, where present, are weak and discontinuous, in Michigan. The most persistent magnetic horizon related to the Upper Huronian iron formation of Michigan falls at or near the hangingwall contact of the iron formation with its overlying slates. There are also irregular and locally strong magnetic horizons in the footwall black slate of the Upper Huronian, but these are less persistent and continuous than the hangingwall magnetics.

Other generalizations have been found useful. For instance, the large areas of Upper Huronian slate give monotonous, low, flat, magnetic profiles in most cases. The large dolomite areas of the Lower Huronian usually reflect their presence in subnormal magnetic readings and little relief in the magnetic profile. Oxidized, non-specular iron formations often yield marked sags in the magnetic profile, which reach their lowest readings over ore bodies. Unoxidized carbonate iron formations usually produce erratic, ragged magnetic profiles. Metamorphic iron formations, such as those of the western Gogebic and eastern Mesabi, usually yield high magnetic peaks. Such metamorphic iron formations are often found along the axes of folds on the Cuyuna range. The shattering along such axes has often resulted in ore bodies which bottom on the metamorphic iron formation below, and hence some of the strongest magnetics coincide with the more important ore bodies on that range. Most of these Cuyuna range magnetics register on a common dip needle.

Specular hematite iron formations usually have considerable magnetism, and yield bold magnetic profiles, relatively persistent and continuous along the formation.

Most of the magnetic work on the Vermillion has been with the common hand dip, and rather little is known of the effect of the Vermillion iron formation on super-sensitive instruments. On both Mesabi and Gogebic ranges the magnetic horizons, in the productive portions of the ranges, are confined chiefly to the lower part of the hangingwall slate series. There are, however, weak magnetic horizons in the iron formation on these ranges, traceable with very careful dip needle work, and probably easy to trace with the more sensitive instruments. The above generalizations are offered to show that much can be deduced from the type of behavior of the magnetic readings and profiles and magnetic horizons in any given area, beyond the mere tracing of single magnetics.

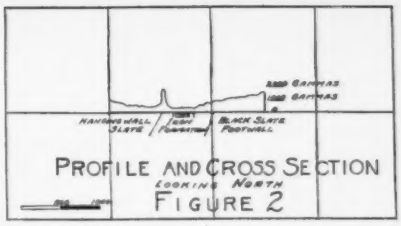


FIGURE 2

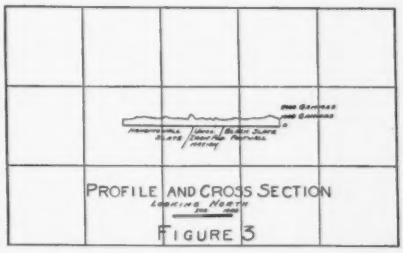


FIGURE 3

Herewith are given a few illustrations of the use of magnetic surveying in the solution of special problems.

Figure 1 shows the use of closely detailed magnetic surveying in tracing an ore-bearing horizon in the Upper Huronian of Iron County, Mich., around a fold. The iron formation here is over half a mile broad, enclosed between a hard graywacke hangingwall and a graphitic slate footwall. It is interleaved with graphitic slate and graywacke bands, and varies widely in iron content and favorability to ore concentration.

The probable existence of an anticlinal structure was deduced from general field relationships, a few drill holes, and scattered mines and explorations in the region. Prior to magnetic survey, little of the detail structure was known. The existence of the hangingwall slate was known in one drill hole only in the northern part of the area. The graywacke band in the iron formation was known in a couple of holes near the western edge of its ledge outcrop as drawn.

An ore body was known to exist 400 feet below ledge at the point shown on the west margin of the map, with northeasterly strike and a dip of about 45° to the northwest.

The problem was to trace this ore horizon eastward, with emphasis on the possibility that the supposed anticlinal structure of the area would swing the ore horizon southward onto the next forty to the southeast and possibly on to its neighbor to the east. Magnetics

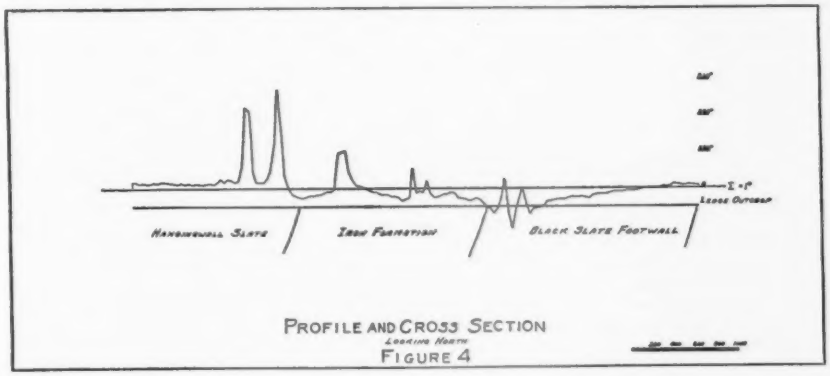


FIGURE 4

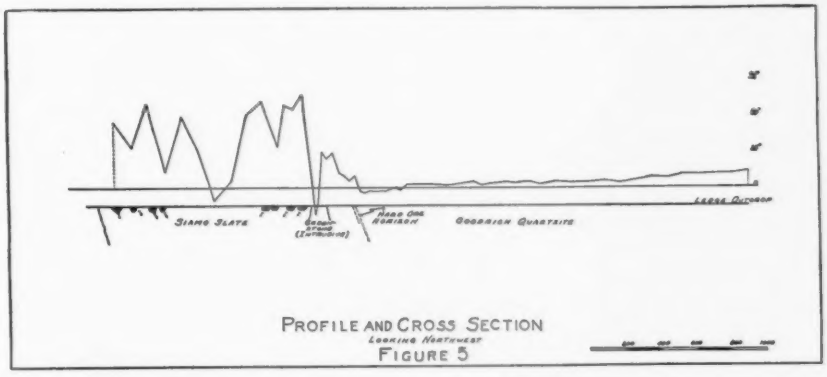


FIGURE 5

in the area proved to be very weak, and a sigma as small as 1 degree on the superdip was required to get appreciable response to most of the local anomalies. Many of the magnetics proved discontinuous, weak, or highly variable in intensity. Traverse lines were located at very close intervals, as shown by the dotted lines on the map. Readings on the traverses were taken at 12½-pace intervals. The forties to be explored are indicated on the map by hatching on their boundaries.

The first attempt at mapping was by plotting profiles along the traverse lines. These proved too bewildering for effective use. Resort was next had to contours of equal superdip reading, drawn on the map. This produced a complicated map, which due to wide local variations along the strike of any given magnetic horizon, gave little if any key to the structure.

The map in Figure 1 herewith was obtained by plotting all of the peaks, big or small, on the traverse lines, and varying the strength shown on the map in accordance with the superdip readings of the peaks. In this way the structure was traced as shown on the map in Figure 1. These variations were so fine they cannot all be reproduced on the scale of this map. Allowance was made for the northwesterly dip of the ore body as indicated 400 feet below ledge. This horizon was then carried around the fold parallel to the magnetic horizons as plotted. Drill holes were spotted on the zone so plotted in the property to be explored, and an ore body was drilled up.

Neighboring drilling by others checked the position of the hangingwall slate and of the graywacke band as plotted in Figure 1. This problem illustrates the possibility, by detailed high-sensitivity magnetic surveying at close intervals, of tracing a single ore-bearing horizon in weakly and intermittently magnetic iron formation, over half a mile in breadth of outcrop, in an area devoid of outcrops, and covered by upward of 100 feet of glacial drift, around a fold whose outlines were only known through the results of the magnetic survey, checked by the subsequent drilling which found the ore.

Figures 2 and 3 show comparative magnetic profiles taken with the magnetometer. These profiles are taken east and west across an iron formation whose strike is north and south. The location is in the Upper Huronian iron formation of Iron County, Mich.

The actual known ledge outcrops of the formations are shown in cross section underneath the profiles. The actual readings reduced to gammas, or magnetic units, are shown on the profiles.

Figure 2 is a cross section across the iron formation where thoroughly oxidized at the north end of an ore body, with from 100 to 150 feet of glacial drift cover. Note the sag in the magnetic profile over the oxidized iron formation and ore; the abruptly contrasting magnetic peak at the hangingwall edge of the iron formation, and the rise of the profile both into the footwall and into the hangingwall.

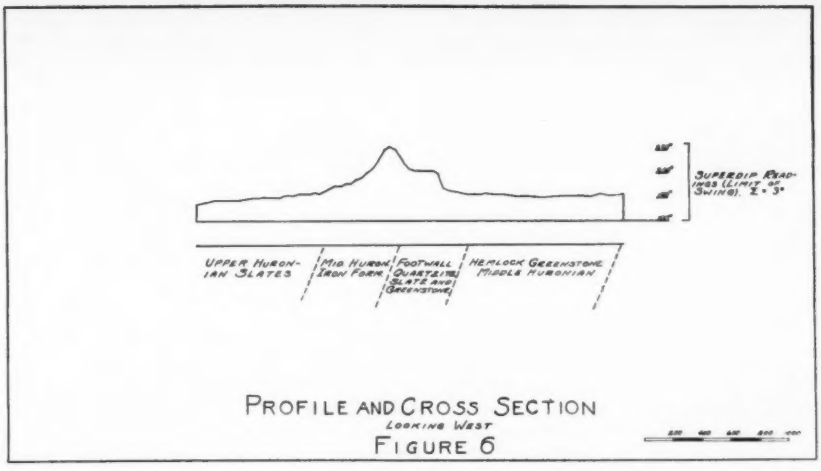

Superdip Readings (Limit of Swing) Σ = 3°
Upper Huronian Slates
Mid Huronian Iron Form.
Footwall Quartzite, Slate and Greenstone
Hemlock Greenstone Middle Huronian
PROFILE AND CROSS SECTION
LOOKING WEST
FIGURE 6

Figure 3 shows a magnetic profile and cross section across the same iron formation several miles south of Figure 2, where an unoxidized or carbonate condition of the iron formation is found to exist. The glacial drift cover at this point is from 10 to 30 feet. Note the absence of the sag in the profile over the iron formation, with little major difference between the magnetic intensity in foot, hanging, and in the formation. The chief noticeable characteristic of the iron formation is a rather ragged profile. The peak at the base of the hangingwall slate series is, by contrast, less conspicuous than on the oxidized, ore-bearing iron formation in Figure 2.

Figure 4 is a superdip profile, with sigma of about 1°, taken near Figure 3, across the iron formation in an east-west plane. This profile is plotted in more detail than the magnetometer work in Figure 3, with observations every 12½ paces. It shows a similar lack of major relief between the iron formation and the foot and hanging slates, and a general high level of the magnetic profile across the carbonate iron formation. Subsequent drilling proved that the lowest readings, near the footwall, reflect the presence of local horizons of partly oxidized iron formation. The usual serrated character of the profile across the carbonate iron formation is typically illustrated by Figure 4.

Figure 5 is a profile and cross section, with the common hand dip needle, across the hard ore horizon, from northeast to southwest, on the south limb of the Marquette range. The Goodrich formation is a quartzite, grading upward into the Michigamme slate, both of which are Upper Huronian. These formations rest unconformably on the Middle Huronian Negaunee iron formation, which is locally much metamorphosed, with the development of grunerite. The metamorphism is accompanied by much diorite intrusion. The unconformable contact between the Middle Huronian and the Upper Huronian is the locus of the hard ore horizon. The section illustrates the low, flat, magnetic profile over the Upper Huronian quartzite and slate, with an abrupt change to high and erratic magnetics as the contact with the metamorphic Middle Huronian iron formation is reached. It also illustrates the low magnetic reaction of the intrusive diorites within the iron formation. Depth of cover is about 50 feet on the Upper Huronian quartzite and slate, about 30 feet at the hard ore horizon, and from 20 feet to zero on the Middle Huronian iron formation and the diorite. Figure 5 shows the comparative ease with which most of the hard ore horizon of the Marquette, and much of its underlying iron formation, may be traced with the hand dip needle.

Figure 6 is from field work by the writer. It illustrates a typical cross section looking west, along the strike of a specular hematite Middle Huronian iron formation of the Menominee range. The formation strikes east and west, dips south, and is overlain by non-magnetic Upper Huronian slates and underlain by Middle Huronian footwall slates and Hemlock greenstone, which at this point is non-magnetic. The southerly dip of the specular iron formation is clearly reflected in the gradual falling away and flattening of the magnetic profile to the south under the slates, contrasted with the abrupt drop to the north as the footwall of the formation is passed. The depth of drift cover varies from zero on the greenstone to an average of some 50 feet on the iron formation.

These rather random illustrations have been selected with the idea that they may show the usefulness of different types of instruments in recording the magnetic thumb prints and Bertillon measurements of different types of iron formations. The presence of a magnetic anomaly and its pursuit over a more or less extended terrain is not the only service magnetic surveying can render. The comparison of the magnetic pictures of known formations under known condi-

(*Concluded on page* 48)

Peace Patriotism

(*Continued from page* 16)

his job and recognizes how important to his country it is for him to be in Congress.

These pressure groups know that it takes votes to elect a member of Congress. They do not always tell him bluntly that if he does not vote with them, they will vote and work against him, though sometimes they are quite plain on this point. Some of these groups are organized because they know that the measure they advocate would not pass on its own merits without the pressure of implied or threatened political consequences. A surprising proportion of the citizenship belong to one or more of these pressure groups. They may, and frequently do, disapprove of measures advocated by other groups, but their attitude toward the poor Congressman is determined, not by his whole record, but by his vote on their particular measure.

There is little trouble for a man to keep in Congress if that is his only purpose, as is apparently the case with some. All such a member has to do is to make a correct appraisement of the number of votes affected by his vote on each measure and vote consistently with an eye single to his political interests without regard to the welfare of his country.

\+ + +

"As you are affected by all these and many other governmental activities, it is very much to your interest to exert yourselves to get and keep in public office men who are able, honest, and efficient and who understand your problems. * * *"

\+ + +

"A study of the mail which comes to a Senator discloses that practically all of it is devoted to the advocacy of the personal interests of the writer. * * *"

\+ + +

There is a large but unorganized group composed of those who maintain in peace time the same patriotic attitude as in war time, and who place the general welfare above their interests in particular measures.

If there could be an increase in the number of citizens actuated by such a genuine interest in the public welfare and if their group could be in some effective manner organized, our country and its citizenship would profit greatly. The mining industry, dependent as it is on the general prosperity way, should give more attention than it has to these matters affecting the general welfare.

A feeling of assurance on the part of a Senator or a Congressman that his record would be judged by his constituents, not from the selfish standpoint of each individual, but by its effect on his country's welfare, would strengthen the courage of many to resist the efforts of pressure groups and would greatly improve the quality of congressional legislation.

There are, fortunately, a large number of Senators and Congressmen who vote their convictions as to the welfare of their country, regardless of personal, political consequences. To a considerable degree, the citizens of a state or district can determine what kind of Senator and Congressman will represent them. The more genuinely public-spirited and patriotic the citizen is, the better will his Senator and Congressman be. That is, your representatives in Congress are largely what you are and what you make them.

● EIGHTY coal operators met at the Biltmore Hotel in New York City early in December to create an organization whose purpose will be the consideration of measures designed to regulate the bituminous coal industry. It is reported that all districts east of the Mississippi River except Harlan County, Ky., and western Kentucky were represented. Charles O'Neill, president of the United Eastern Coal Sales Corporation served as temporary chairman and E. G. Mathiodd, vice president of the Valley Camp Coal Company, served as temporary secretary of the conference. The following resolution was adopted:

"*Resolved*—It is the opinion of the committee that legislation affecting the bituminous coal industry will inevitably come before the session of the Congress which meets on January 5, 1937. In this circumstance your committee believes it to be to the best interest of the bituminous coal industry to have a committee representative of the operators of the country prepare a bill for the regulation of the bituminous coal industry to effect its stabilization. This committee shall hold meetings at which any bituminous coal operator may present his opinions, and that after such meetings the committee will draft a plan with which to appeal for the support of the bituminous coal industry for the achievement of permanent stabilization for the bituminous coal industry. And if, in the opinion of the committee, such a plan of regulatory legislation is given the endorsement of a substantial majority of the bituminous coal operators, the committee will appear before the proper committees of the Congress, to urge favorable consideration of the measure, and to secure its enactment.

"The committee recommends that a special legislative committee be created to consist of authorized representatives of the cooperating companies, as follows: One representative each from the following district — Kanawha, Logan, Williamson, Hazard, Harlan, Southern Appalachian, Virginia, Big Sandy. Eastern Pennsylvania, including Somerset County and Maryland, five representatives; Western Pennsylvania, five; Southern Smokeless district, five; Illinois, four; Indiana, two; Ohio, four; northern West Virginia, four; Panhandle district of northern West Virginia, two; western Kentucky, one; Alabama, one; Southwestern states, one; Rocky Mountain states (Wyoming, Montana, Washington), one; Colorado and New Mexico, one; Utah, one; and Iowa, one.

"The committee recommends the employment of Messrs. Liveright, Steinbugler and Essington as counsel for the committee and to constitute its legal advisory committee and payment of their proper fees and expenses.

"The committee to employ other counsel and assistants as it deems necessary and to pay them from its funds.

"The committee is authorized to levy an initial assessment of one-fourth (¼) mill per ton on the annual 1935 tonnage of each cooperating company, to finance its work.

"It is recommended that the members of the committee arrange for the payment of their expenses, in connection with the committee work, by the operators of their districts, outside of the one-fourth (¼) mill per ton assessment recommended above."

● NORTHEASTERN United States has held a major rank as an iron and steel producing district for nearly 300 years, and today in 79 communities of that region there are 110 separate plants where steel and iron products are made, according to the American Iron and Steel Institute.

The first successful iron enterprise in America was a furnace established in 1645 at Saugus, Mass., which had a capacity of about 400 tons of iron per year. Today the 26 giant blast furnaces in the eastern district together can produce as much as 5,000,000 tons of iron per year—or about 12,000 times as much as the country's pioneer furnace.

More than 72,000 employes are at work in eastern district iron and steel plants. Current payrolls of the plants are about $9,000,000 per month.

Covered in the Institute's definition of the eastern district are the New England states, and that part of the country north of Virginia and east of a line drawn north and south through Altoona, Pa. In addition, Marion and Harris Counties in West Virginia are included, as well as that part of Maryland which is west of the north-south line.

Coordinating Health Conservation with Safety in the Mining Industry

By FRED A. KRAFFT*

THE average industrial worker is only about 75 percent physically efficient. The principal reason for the missing 25 percent is largely due to ignorance on the part of the worker of such important subjects affecting his mental and physical condition as dietetics, nutrition, the prudent purchase, the efficient preparation and the chemistry of foods, personal hygiene, control and cure of communicable diseases, treatment of diseases affecting the functional organs of the body, and kindred knowledge affecting the well-being and fitness of the human machine.

Along with the worker's ignorance of such matters, follows the employer's indifference to the worker's ignorance. Except as the employer maintains a modern employment and physical examination procedure and except as he maintains a medical and public health nursing program that should break down this ignorance of the workers, the average employer is extremely indifferent to the physical limitations and the functional or constitutional disorders of his employes.

Medical science, experts in management, industrial and human relations, safety and other functions of business can well take time out to take stock of what is being done in "humanics" in the same manner that attention has been given to the mechanics of business and industry.

It is well known in industry that the "Monday morning blues" cannot alone be charged to John Barleycorn or other excesses. An overtaxed stomach and liver, with a letup in physical activity, can just as easily give the worker a "Monday head" as is possible with an undue intimacy with "John Barleycorn." The answer to this problem, which involves absenteeism, loss of production, industrial accidents with all of the costs and misery attending same, is to provide facilities in collaboration with the worker that will give him an outlet for his physical energies during his spare time. Athletics in various forms, garden growing, and community outdoor activities will keep the inactive worker out in the air and sunshine and enable him to "burn up" whatever he eats or drinks, whereas physical inactivity for a period of two

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or three days with his customary consumption of "fuel" will send him back to work "clogged up" physically and therefore mentally. You have a fertile prospect for an accident or you have a worker only 75 percent efficient, and up go your production costs and your lost-time accident records.

The mining industry must learn from the experience of other basic industries that employe relationships involving activities of this type are mutually beneficial to the employer and employe. The employer's participation in such activities need not be paternalistic or dictatorial. If such is the case the program will fail and may even be a boomerang to the employer's ultimate disadvantage.

It is better that such a program be mutually cooperative—the employer or his representative serving in a counseling capacity and the employes assuming the major responsibilities for organization and administration of the activities, and likewise furnishing the greater part of the money necessary to finance such recreational program. If the employes are encouraged to organize activities along these suggested lines, they will, individually and collectively, get behind the program in the matter of interest and financial support.

If the employer does not have at his disposal the facilities or personnel, there is no excuse for his failure to attempt the education of his employes in matters of this kind because there is any amount of literature available on these subjects, published at nominal cost by Government and private agencies.

Is it not better health and accident insurance to teach your employes how to eat and live correctly, by the distribution and explanation of such reading matter so that they are efficient and safe workers?

Old Mother Nature, in the form of plenty of air, sunshine, the right foods, a balance of recreation and rest, will, with the occasional advice of the doctor and dentist, develop a high degree of efficiency and safety among your workers.

In our judgment, it is the employer's responsibility to see that his employes are informed in such matters, and the employer's interest in the well-being or physical efficiency of his employes will be returned proportionately in his production costs and accident record.

In the inauguration or administration of a medical program for a large mining operation or for an individual mine, the first question to be solved is what is the company policy going to be.

1. The direct operating costs of a medical program should be supported entirely by the income received from the employes in the form of a monthly medical check-off. Where this arrangement prevails, the employes are inclined to be exacting—that is, they will expect the best possible service because they are paying for it, and they do not look upon the service as a paternalistic gesture of the employer; the employes and their families will be more cooperative in matters of health education and community sanitation because they will feel proprietary partnership in the program. And furthermore, if the employe pays $12 to $18 per year for himself and family, he is buying health insurance and health assurance which, paid on a nominal monthly basis, does not pinch his pocketbook, and purchased on a mass-production basis saves him, if he and his family have any accidents or sickness, possibly $100 or more per year in doctor and drug bills.

The company contribution to the program should include the expense of checking and collecting, each month, the medical dues at no cost to the employe. The administrative costs should not exceed 5 percent of the medical check-off, and this company expense will be more than returned in reduced compensation costs, reduced absenteeism, improved physical condition, and increased production efficiency of the miner and improved sanitary conditions, thereby reducing to a minimum all of these factors which enter into the production and accident costs of coal mining.

2. Should a contract or full-time company doctor be employed? Circumstances and conditions may affect this decision, but in our experience we strongly favor the full-time company physician, and we know that our employes have the same opinions. This is intended as no reflection on contract doctors, many of whom are equally as conscientious and as thoroughly competent as the full-time company physician. But the company organized and supervised medical program and the full-time salaried company physician have demonstrated its efficiency and its benefits to employer and employe to a marked degree.

3. What measure of service is to be rendered the employe and his family in return for his monthly check-off? Here again you have conditions and circumstances affecting opinions or decisions. In the main, however, the employe and his family are entitled, in consideration of his medical dues, to free medical service, and free drugs supplied either through the company or, in the case of the contract system, by the doctor. The doctor should be provided with a sanitary medical office with modern facilities and equipment, enabling him to practice all phases of modern medicine. All applicants for employment and the old employe and his family should be immunized against typhoid and scarlet fever, smallpox, and diphtheria at no cost to the employe.

A well-rounded program in a mining community should provide for periodical analysis of the milk and water supply for impurities and bacteria, and the necessary precautions should be taken to assure a milk and water supply that meets with modern public health standards. In an extensive mining operation where stores, recreation buildings, clubhouses, restaurants, or similar enterprises are a part of the community, an examination of food-handlers should be followed twice a year, at no cost to those affected. Where communicable diseases are discovered, a diligent follow-up for the correction or cure should be a part of the program.

Physical examination for all new employes and periodical reexamination of all old employes should constitute an important phase of the program. The medical program and personnel should be coordinated effectively with the production department or any other departments responsible for the general operations of any mining community, and every effort should be made to make each and every employe public health and safety conscious.

4. In any mining operation involving a community set-up, where an extensive house plant is an adjunct of mine operations, provision should be made for the erection and maintenance of sanitary toilets; garbage cans should be provided for each householder, at no cost to the employe except a deposit to assure the return of the can to the company, and weekly disposal of garbage should be maintained by the company at a nominal cost to the employe.

We have found that periodic sanitary inspections have materially reduced the cost of garbage disposal, house plant maintenance, and in general has greatly improved the community appearance of our house plant and has raised the general level of health within the community.

5. What program of public health service and education will a company maintain? We have found in our own organization, embracing an average working force of 10,000 to 12,000 and community populations ranging from 1,000 to 12,000, that it has been mutually beneficial to the company, its employes, and communities at large to maintain in conjunction with our medical program and staff, a group of public health nurses. All of our nurses have had basic instructional training and experience, augmented by public health training in recognized schools.

In addition to assisting the company physician during office hours and following up the more serious medical cases in the homes, our nurses have projected a public health program in the homes of the various communities, and particularly in the schools. This program involves the following features:

1. Sanitation.
2. Preparation of foods.
3. Care of babies.
4. Diet and nutrition.
5. Instruction in bedside care.
6. Observation of symptoms.
7. Temperature and respiration.
8. Applying cold, heat, and counter-irritants.
9. Care of communicable diseases.
10. First aid of common ailments and emergencies.
11. Clinics—
    - (a) Prenatal.
    - (b) Infant.
    - (c) Dental.
    - (d) Tuberculosis.
    - (e) Nose-throat.
    - (f) Orthopedic.
    - (g) Immunization.
12. School health examinations.
13. First-aid classes for school children.

By this program of education and self-help we keep the miner's family well and relieve his mind of worries incidental to family sickness. Everyone identified with safety knows that worry is the cause of many industrial accidents.

We have found it extremely beneficial that we organize home hygiene classes and care of the sick classes among the older women and young women of each community, so that we are prepared to meet any emergency, as for instance a mine catastrophe or any epidemic, such as influenza, typhoid fever, smallpox, and diphtheria.

Our nurses assist our doctors in our immunization program, which involves the miner and every member of his family. During the past several years, in cycles of three years, we have immunized against typhoid, scarlet fever, smallpox, and diphtheria practically 95 percent of our adult population, as well as our children. The immunization of our children is made comparatively simple through cooperation with the local school systems.

Prior to the inauguration of our immunization program in one of our large Kentucky divisions, it was not uncommon in a population of approximately 10,000 to treat 200 to 225 cases of typhoid fever each year with a resulting death rate of 10 percent to 12 percent. For the past seven years we have treated only 14 cases of typhoid, those mostly transitory, and of these 14 cases there have been 2 deaths.

Where a company is organized in large operating units so as to justify the employment of a full-time salaried doctor and a full-time public health nurse, it is essential that the activities developed and administered by the medical section of the department should head up under the supervision of one company official, especially qualified to coordinate the activities of those two branches of the program.

6. What arrangements or provisions will be made for hospitalization of illness and injury cases that cannot be properly treated in the home or in the doctor's office? There has been a general movement on foot for several years among progressive employers, doctors, and social leaders for a combined hospitalization and medical program that will serve industrial workers and their families on the so-called insurance basis.

Those who are familiar with hospitalization programs in certain portions of West Virginia, Pennsylvania, and Kentucky are aware that a miner can insure himself and his family against hospital care and medical service for from $1.50 to $2 per month. Hospital statistics show that such hospitals as provide this service are patronized at the rate of about 30 percent per year per men employed. They also show that over a period of five years practically 100 percent of the men employed, or their families, are served by those hospitals; so that it is reasonable to assume that for an investment of approximately $18 to $24 per year a miner and his family are insured against a probable outlay ranging from $100 to $200 per year.

The service rendered by these hospitals is a boon to any mine community and to many individuals within it. It should therefore be one of the major factors of any medical program that coal operators provide some form of hospitalization, either in company-owned hospitals or in outside hospitals, wherein these arrangements can be organized in such a manner as to be profitable to the employer, the employe and his family, to the hospital, the medical profession, and the community as a whole.

In the Consolidation Coal Co. we have addressed ourselves to the problem and program of keeping the miner and his family well, because we have found that it costs less to keep them well than it does to treat them when they become sick.

When our medical program was launched, 90 percent of our medical staff was made up of contract doctors who served for the check-off paid to them over the pay roll by our employes. There was such general dissatisfaction with this plan that, at the request of our employes in several divisions, we reorganized our program, continuing in employment some contract doctors whose services were satisfactory and desired to remain under the reorganized plan, and whose ideals as to service were in keeping with the program. We immediately developed a plan where young doctors who had been graduated from recognized medical schools and who had served interneships of at least two years were assigned to the task of keeping the miner and his family well. Benefits of the plan began to assert themselves immediately.

Following inauguration of our medical program, a standard list of 133 drugs for all of our medical units was adopted. By centralized purchasing in wholesale lots, six times per year, we were able to save approximately $10,000 in the first year under the new plan. Physical layout, physical and technical equipment of the offices, and the general procedure of our medical units also have been standardized so that today every one of our medical units rates far above the average in appearance, equipment, etc.

A program of physical examination has assisted the operating units in weeding out undesirable employes who, because of disease or other infirmities, might automatically become liabilities in the matter of accident, compensation, and group insurance.

That physical examination of employes is an important matter goes without saying. After examining 1,000 applicants in one of our operating divisions we found the following: 28.5 percent were not handicapped by any physical defects which would disqualify; 48.5 percent did not show physical defects sufficient at that time to disqualify, but had defects which needed correction and which if not corrected might disqualify later; 23 percent were absolutely incapable of performing manual labor. This group was examined by seven different physicians. The percentage of rejections ranged from 17 to 27 percent. The most important disqualifying conditions are as follows:

Defective vision.
Hernias—or potential hernias.
Heart conditions.
Varicosities.
Venereal diseases.
Lung conditions.
Kidney conditions.
Hemorrhoids.
Old deformities.

An authentic duplicate record is maintained in each medical unit, showing home and office calls, with name of patient, age, race, color, married or single, nature of disability, and under remarks, any other pertinent information that will assist the doctor, nurse, or hospital in follow up of the case.

The public health nurse maintains a record for every family, indicating the general physical condition of each member of the family, dates of immunization for all contagious diseases, physical defects covering limbs, eyes, ears, nose, throat, teeth, weight, etc. This record, when used in connection with periodical physical examination, is extremely valuable to the company doctor where he is called to treat any member of the family.

The nurse's record of prenatal and postnatal mothers is also valuable to the doctors, and our prenatal and postnatal clinics are directly responsible for an ex-

(*Concluded on page* 40)

Certain Blasting Problems and Their Solution in Anthracite Mines[1]

By S. P. HOWELL[2] and B. L. LUBELSKY[3]

EXPLOSIVES accidents in anthracite mines year by year have consistently exceeded the explosives accidents in bituminous coal mines, whether the comparison is made on the basis of quantity of explosives used, exposure, or production. In 1934 anthracite mines used about 47 percent as much explosives as bituminous coal mines; required about 30 percent as many man-hours for the production of coal; and had about 71 percent as many underground fatalities caused directly by explosives as bituminous coal mines.

About 8.6 percent of the fatalities in anthracite mines are charged to explosives; 2.4 percent of the fatalities in bituminous coal mines are charged to explosives. These figures indicate that attention may be given profitably to the prevention of explosives accidents in the anthracite region. The authors have done so on a cooperative basis; the results of the field work and laboratory testing incidental to a few of the problems are given here.

The anthracite industry could have been more aggressive in its acceptance and promotion of two major safety developments in the use of explosives—the introduction of electric blasting to replace blasting cap and fuse, or squib, and the replacement of high explosives and black blasting powder with permissible explosives. Compared with the other branch of the coal-mining industry, however, the anthracite industry has been both a pioneer and progressive.

It is estimated that about 65 percent of the coal in anthracite mines is blasted with permissible explosives; the corresponding figure for bituminous coal mines is 40 percent. Within the last 10 years there has been a very substantial increase in the proportion of shots fired electrically in the anthracite region, and now some of the state inspection districts and some of the anthracite companies fire all shots underground electrically; the Philadelphia & Reading Coal & Iron Co. has pioneered in this field.

The authors are strongly of the opinion that accidents underground with explosives and blasting are determined so largely by the blasting practice, by the condition of the explosive when used, by misfires and premature explosions, and by gas ignition—either by the kind of explosive used or by the character of the electric current used for firing—that these items were given major consideration.

The Bureau of Mines in its conditions specified for use of permissible explosives limits the quantity per shot to 1½ lb.; does not approve the firing of dependent shots; and, except under very special conditions, does not provide for firing more than one shot at a time; the users of explosives in the anthracite region, however, often have found it extremely difficult to meet these conditions and sometimes have acted on the assumption that "since we usually cannot undercut and frequently must use more than a pound and a half of permissible explosives per shot, and it is not a permissible explosive when so used, we may as well use high explosives or even black blasting powder." The following, however, is already on record in a recent Bureau of Mines publication:[4]

"If permissible explosives are confined adequately in the borehole and the charge is proportional to the burden, the difference in safety between 1½ and 2 lb. of explosive is, in all probability, not much if any greater than the difference in safety between 1 and 1½ lb. of permissible explosives."

It is stated also in this publication that the safety factor of permissible explosives over black blasting powder is at least 45, and over common dynamite is at least 17. There is every reason for believing that this safety factor still obtains when permissible explosives are used in excess of 1½ lb.

In 1930, the Philadelphia & Reading Coal & Iron Co., recognizing the importance of improving certain blasting practices and explosives in its mines, and the Bureau of Mines, recognizing the value to others of the results of such improvements, began a cooperative study of the handling and use of explosives in the mines, supplemented by field tests, principally at the testing grounds of the company.

The investigation, which continued intermittently for about two years, consisted of a detailed underground place-by-place study of the actual methods of blasting and handling explosives as practiced normally by the miner.

At the time the investigation was started the company had already substituted all-electric firing for blasting cap and fuse, although the change had been completed only a short time. The company had also begun to substitute the permissible type of explosive for the explosive used in coal blasting, replacing approximately 2,800,000 lb. per year of a low-grade dynamite known as Judson FF and Judson FFF. By 1932 the quantity of Judson powder used had been reduced to less than 43,000 lb. and none was used in 1933 or subsequently. At present, therefore, all explosives used for blasting coal in the anthracite mines of this company are permissible.

The first obvious problems that concerned the investigators were (1) burning explosives in the borehole; (2) proper storage; and (3) electric blasting.

1. Burning explosives in the borehole was one of the most common complaints. This hazard was very serious, since it was the cause of many known small gas ignitions, and was at least a probable cause of many small but very expensive mine fires; therefore, immediate study of this problem was important.

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[2] Explosives engineer, U. S. Bureau of Mines, Safety Division, Health and Safety Branch, Pittsburgh, Pa.

[3] Explosives engineer, Philadelphia and Reading Coal and Iron Co., Pottsville, Pa.

[4] Harrington, D., and Howell, S. P., "Preventing Accidents by the Proper Use of Permissible Explosives." Bureau of Mines Technical Paper 567, 1936, p. 30.

Explosives burning in the borehole could be traced to one of several causes: (a) Material which was not sensitive enough to detonate after storage under the average conditions existing in the mine magazine and in underground storage and handling; (b) material which was normally sensitive enough but which had been rendered insensitive by very bad storage conditions; (c) material which at the time of use was sufficiently sensitive but failed to propagate because of improper method of charging the borehole, in which process considerable inert material was allowed to get between two cartridges.

Most of the complaints investigated were with regard to Judson dynamites; a large number referred to material that had been allowed to remain in storage too long; others, however, revealed that even under normal conditions of storage and handling the Judson dynamites were not sensitive enough to assure propagation (or extension) and caused many burning explosives.

As the program of replacing the Judson dynamites was already under way, the major portion of the study of sensitiveness was devoted to the permissible type of explosive which was being used.

2. Proper storage, both outside and underground, was a natural correlative of burning explosives. Each brand of permissible explosive used was subjected to a storage test in one of the storage magazines, which will be described later. Halved-cartridge gap tests were made on each sample when placed in storage. This would be several days after the known date of manufacture. Each sample was tested weekly thereafter, both normal and crimped-end gap tests being made. It is necessary to understand the difference between these tests. In the normal test the cartridge is halved and the two fresh ends are faced together. In this test a propagation (or extension) through the air gap essentially indicates the sensitiveness of the explosive in the center of the cartridge. In the crimped-end test, propagation (or extension) takes place through the crimped ends instead of through the cut ends. The crimped-end test is the important practical one for the user for several reasons. Cartridges in the borehole are propagated through the crimps so that any test that does not take the crimps into account is not complete. The user desires to know whether this material will propagate as used. The material at each crimp consists of folds of paper and paraffin; two crimps face each other and offer considerable interference to propagation, which is not measurable and in no way indicated by the normal gap test. This is so pronounced that with some brands of permissible explosives the normal gap test showed a 10-in.-gap sensitiveness, which was well above the average, whereas the crimped-end test showed failure to propagate when the halved-cartridges were in direct contact. Immediate practical value to the user lies in the latter test. The normal halved-cartridge gap test is certainly of value to the manufacturer in checking individual mixes and in the development of new explosives.

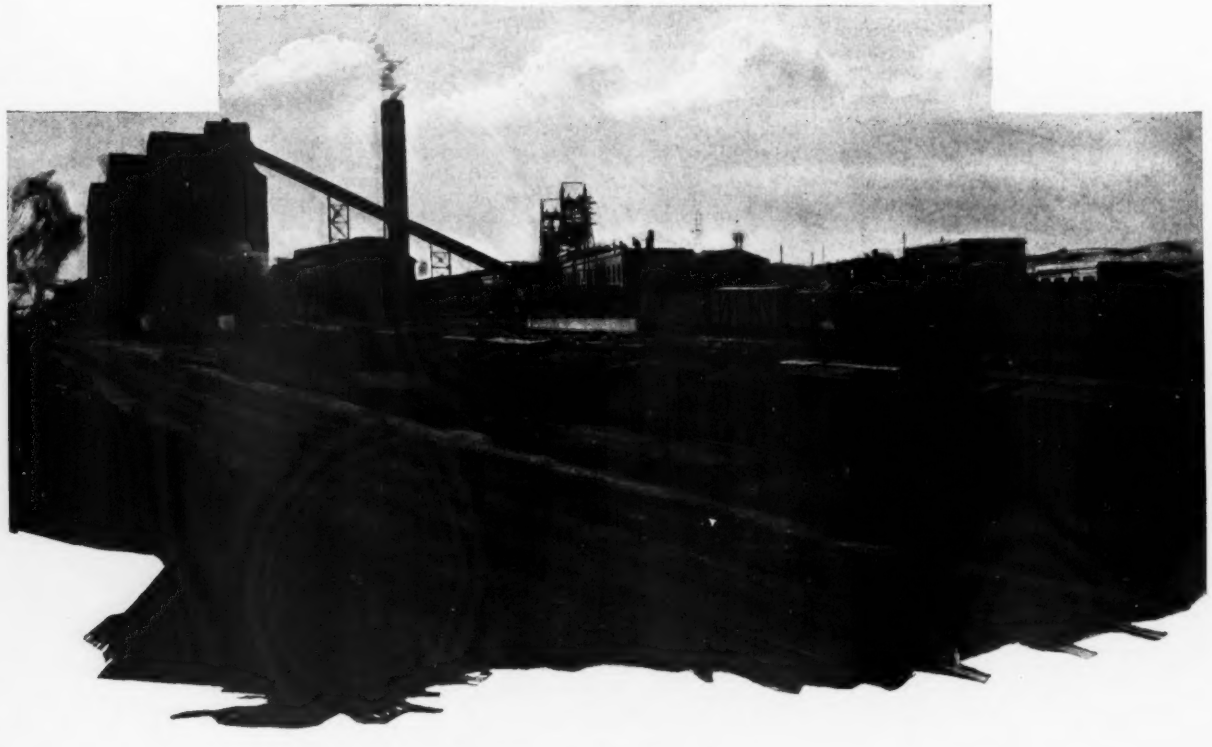
Considerable discussion has resulted from the difference in opinion as to the relative merits of the normal and the crimped-end gap tests; it is the opinion of the authors that the crimped-end test is the only informative one for the consumer interested in tracing underground trouble due to insensitiveness. It is true that the crimped-end test gives varied and often erratic results regarding the gap through which different samples of the same explosive can be propagated, but this very fact is essential to our knowledge of burning explosives, because the explosive in the borehole must propagate through the crimped ends, and the minimum gap must be sufficient to insure propagation in the borehole under all reasonable conditions. This problem is neither new nor confined to the anthracite region, since it was given consideration as long ago as 1927[5] in connection with bituminous coal mining.

This series of tests gave some very important results. The first reduction in sensitiveness commonly occurred in the crimped-end test, which preceded the break in the normal gap test by approximately six weeks. The fall in sensitiveness in the crimped-end test was very pronounced after three months, whereas the fall in the normal gap test was very slow.

As a result of this information, a ruling was made that no material would be sent underground if more than three months had elapsed from the date of manufacture. This is controlled by a monthly magazine inventory; the colliery storekeepers report the brands of per-

(*Concluded on page* 40)

[5] Lubelsky, B. L., "Permissible Explosives in Coal Mines." *Modern Mining*, January, 1927, pp. 3-7.



Conference of Coal Operators Committees

THE Coal Operators Committees of the American Mining Congress held a general Conference in Pittsburgh at the William Penn Hotel on November 13 and 14. The purpose was to bring together the men on the various committees to discuss subjects for further district reports and to make plans for the National Project reports. During the first eight months of the year the district committees had submitted nearly 60 reports and several National Project reports had been made ready for compilation.

The committees met together at 10 o'clock on Friday morning. In opening the session, Julian D. Conover, secretary of the American Mining Congress acted as chairman and said in part "On the last of January this year we held here in Pittsburgh our first general meeting of our Coal Operators Committees. At that time these committees had just been organized and we were in some doubt as to how we were to proceed in gathering and compiling information which would be of practical interest and value to coal operating men. Today we do not have that uncertainty. The work that the committees have done, the interest and the cooperation of the men who have taken part in preparing the reports, have shown that we were going about this in the right way. The recognition that the reports have received—not only from our committee members but from executives and operating officials of large coal companies—has proven that they are of real practical value. We look forward to a continuance of this work and through the cooperation of both branches of the industry — manufacturers and operating men—we feel sure that our future reports will be of continually increasing interest and value to the entire industry, and a real factor in its progress toward modernized, efficient production methods."

Bruce G. Shotton, of the Hendrick Manufacturing Company, and chairman of the Manufacturers Division of the American Mining Congress said "I don't believe that the manufacturers heretofore have grasped the real significance of what the Operators Committees are doing, but I am sure now that they do realize this importance and feel that their interests are tied up in this work as closely as that of the coal operators. The committees can feel sure of having the full cooperation of the manufacturers in carrying on this valuable work."

G. B. Southward, mining engineer of the American Mining Congress outlined briefly the procedure that was to be carried out and requested that each project committee go into separate sessions and prepare their reports and recommendations that would be made to the Conference at the general meetings Friday afternoon and Saturday morning.

The program was as follows:

FRIDAY AFTERNOON SESSION — PROJECT COMMITTEE REPORTS

Coal Cutting—D. D. Wilcox, chairman; discussion by committee members.

Mechanical Loading—A. W. Hesse, acting chairman; discussion by committee members.

Conveyor Mining—T. F. McCarthy, chairman; discussion by committee members.

Power—Distribution—M. W. Horgan, chairman; C. C. Ballard, vice chairman; discussion by committee members.

SATURDAY MORNING SESSION — PROJECT COMMITTEE REPORTS

Mine Haulage Roads—R. V. Clay, chairman; discussion by committee members.

Accident Prevention—William Crichton, Jr., chairman; discussion by committee members;

Surface Preparation—T. W. Guy, chairman; discussion by committee members.

Mining Systems—F. G. Smith, chairman; discussion by committee members.

Each of these committees recommended plans for the preparation of their National Project reports and submitted outlines showing how these reports were to be prepared and what information they would contain. The project committee on power distribution lines submitted their completed report which was approved by the members of the project committee and this report is now ready for circulation to all committee members.

On Friday night an informal dinner was held with Charles Connor of the Nellis Coal Corporation acting as toastmaster. About 35 men attended and informal talks on a number of interesting subjects were made by many of those present.

The following members of the district and project committees attended the meetings on Friday and Saturday:

L. B. Abbot, Consolidation Coal Company.

A. R. Anderson, The Jeffrey Manufacturing Company.

J. E. Borland, Westinghouse Electric & Manufacturing Company.

George S. Baton, George S. Baton & Company.

C. C. Ballard, The New River Company.

F. P. Brightman, General Electric Company.

M. L. Coulter, Clearfield Bituminous Coal Corporation.

M. D. Cooper, Hillman Coal & Coke Company.

William Crichton, Jr., Johnstown Coal & Coke Company.

H. P. Chandler, Ohio Brass Company.

Loyal F. Crawford, Goodman Manufacturing Company.

J. D. Conover, Secretary, American Mining Congress.

Charles W. Connor, Nellis Coal Corporation.

J. J. Coffey, Bird Coal Company.

J. M. Connor, West Penn Power Company.

R. V. Clay, Hanna Coal Company.

G. R. Delamater, The W. S. Tyler Company.

C. L. Day, Valley Camp Coal Company.

Frank Dunbar, Mather Collieries.

A. C. Dittrick, Hanna Coal Company.

W. C. Fancourt, The Berwind-White Coal Mining Company.

Max Forrester, Consolidation Coal Company.

E. B. Gellatly, Jeffrey Manufacturing Company.

C. W. Gibbs, Harwick Coal & Coke Company.

T. W. Guy, Consulting Engineer.

H. L. Griffin, Kopper Coal Company.

Willis I. Hill, Westmoreland Coal Company.

A. W. Hesse, The Buckeye Coal Company.

R. M. Hartman, West Virginia Compensation Commission.

M. W. Horgan, Monongahela West Penn Public Service Company.

F. A. Jordan, Youngstown Sheet & Tube Company.

E. H. Jenks, Rochester & Pittsburgh Coal Company.

A. R. Joyce, Wood Preserving Corporation.

L. O. Lougee, George S. Baton & Company.

A. E. Long, Clearfield Bituminous Coal Corporation.

J. G. McCarty, Streeter Amet Company.

J. A. Malady, Post Glover Electric Company.

P. D. McMurrer, West Virginia Department of Mines.

T. F. McCarthy, Clearfield Bituminous Coal Corporation.

G. F. Osler, George S. Baton & Company.

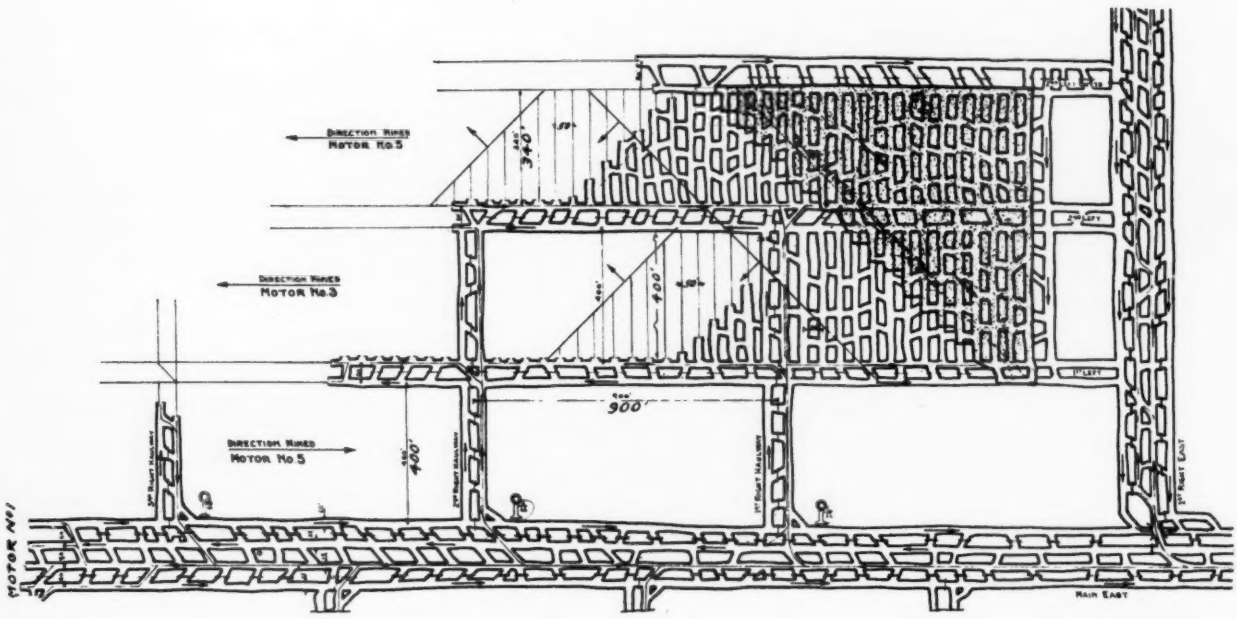
J. T. Ryan, Mine Safety Appliance Company.

(*Concluded on page* 40)

Mechanization Trends

Reports of Coal Operators Committees

Mining Systems With Hand Loading



Pocahontas Mining System

General Description of Operation

THE left side of panel is developed and mined coincidently with and exactly as shown for the right side. Length of face and butt entries are limited only by location of property line.

Motors

No. 1. When No. 1 motor reaches property line it is transferred to develop a new panel.

Nos. 2 and 3. When motors 2 and 3 reach property line they are transferred to same section as No. 1.

Nos. 4 and 5. When motors 4 and 5 reach property line they start retreat with entry, chain pillars, and the 2 blocks of coal adjacent to main entry, thus completing the panel cycle of 4 room entries mined advancing, and 2 retreating.

Shifts and Production

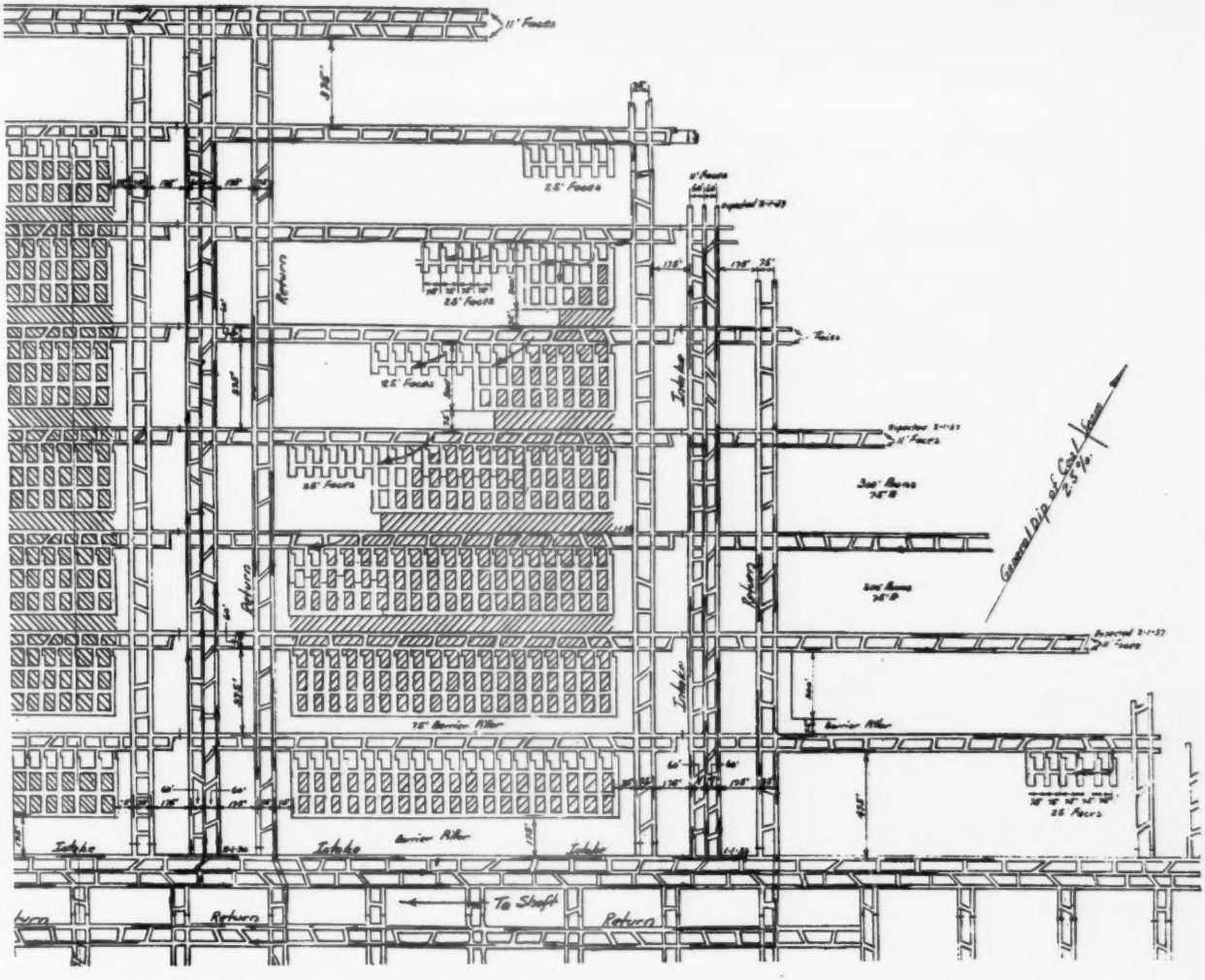
Period of development in shifts = 500. Beginning with 220 tons and increasing to 1,100 tons per shift.

Period of full production of 1,100 tons per shift depends on length of panel.

Period of Declining Production

When No. 1 motor is transferred, panel tonnage drops from 1,100 to 880. When Nos. 2 and 3 motors are transferred panel tonnage drops from 880 to 440 for retreating period.

Places 22' wide—10.5 tons per cut. One cut per shift.



New River Mining System.

THE two drawings submitted here show two mining systems that have been developed in the New River District of southern West Virginia. These are designated as (1) The New River System and (2) The Pocahontas System. Both of these are operated by hand loading under approximately the same general conditions.

The coal is about 3½ ft. thick with a cover varying from 100 to 800 ft.—probably from 300 to 500 ft. would represent the average. The top immediately over the coal is generally a slate or sandy shale. The seams are fairly level. Cutting is done by either short-wall or track-mounted machines, and the drilling is done by the hand miner, although in some cases power drills are used. The gathering is with electrical locomotives, and the mine cars are usually about 3-ton capacity.

These plans are designed to bring about a concentration of working places, a systematic development of the territory, and a rapid extraction of the coal with a high percentage of recovery. Both systems have been carefully planned to effect a balance between the men employed and the equipment used.

The drawings show the method of development and the pillar line. Further explanation of these points is not necessary, but it may be well to call attention to the fact that the New River plan is a modified retreating method while the Pocahontas plan is a modified advancing system.

There are some further differences between these two systems. The gathering track layout in the Pocahontas method varies considerably from the more usual arrangement used in the New River plan. The room length is about the same in each plan, but the New River system spaces the rooms on 75 ft. centers while the Pocahontas method spaces these at 50 ft. centers. This means that the Pocahontas plan takes a larger percentage of coal in the first mining and a less percentage in the pillar recovery than the New River. Another difference is that the New River operation drives six rooms abreast while the Pocahontas mine drives these on a 45° advancing line.

In both operations the pillar line follows closely behind the room work so that the room pillars do not stand for any appreciable time before being drawn. The Pocahontas plan drives the rooms through to the next air course ahead while the New River system leaves a 75-ft. barrier at the end of the rooms. This barrier, however, is recovered with the room pillars so that the break line extends continuously across the retreating entries in the panel.

The following figures show for each system the percentage of the coal for each class of mining that is produced from a complete panel:

	New River System	*Pocahontas System*
Entry tonnage	10%	12%
Room "	42%	44%
Pillar "	48%	44%

—Submitted by J. M. Clark, New River District of West Virginia.

Bureau of Mines Statistics MECHANICALLY LOADED and CLEANED COAL for 1935

Mechanical Loading Underground in Anthracite and Bituminous Mines in 1935

THE amount of coal mechanically loaded in American coal mines in 1935 exceeded the record for any previous year. The total, for anthracite and bituminous coal in 1935, was 56,485,534 net tons. The year which approached nearest to this record was 1931, when 51,946,888 tons were loaded.

Mechanical loading in anthracite mines in 1935 (9,279,057 net tons) was practically the same as in 1934, despite a decline of 6,165,000 tons in total anthracite production. Mechanical loading in bituminous coal mines in 1935 was 47,206,477 tons, an increase of 5,773,742 tons over 1934 compared with an increase of 9,956,000 tons in total bituminous production.

The figures given in the following tables are made possible by the courtesy of the mining companies supplying basic data to the Bureau of Mines. Manufacturers of equipment cooperated to insure the completeness of the record. Messrs. Michael J. Hartneady, secretary, Pennsylvania Department of Mines; Hugh McLeod, Wyoming state inspector of coal mines; James McSherry, director, Illinois Department of Mines and Minerals; and Jonas Waffle, managing director, Indiana Coal Trade Association, furnished valuable assistance.

The totals given for mechanical loading are final, but are subject to slight revision before publication in final printed form. Preliminary figures for state and national production have been used in calculating percentage relationship between mechanical loading and total production.

Mechanical Loading in Pennsylvania Anthracite Mines

Preliminary figures for deep-mined anthracite production in 1935 indicate that 43,614,000 net tons were mined, which represents a decline of 4,960,000 tons compared with 1934. Apparently, mechanical loading was little affected by this drop because the production of mechanically loaded anthracite was 9,279,057 tons in 1935, a decline of only 5,429 tons, or one-tenth of 1 percent compared with 1934.

TABLE 1—RELATIVE GROWTH OF MECHANICAL LOADING, HAND LOADING, AND STRIPPING IN ANTHRACITE MINES, 1927-35

Year	Mechanical loading underground*	Stripping	Hand loading underground	Year	Mechanical loading underground*	Stripping	Hand loading underground
Thousand net tons:				Index numbers:			
1927	†2,223	2,153	71,435	1927	100	100	100
1928	†2,351	2,423	67,374	1928	106	113	94
1929	3,470	1,912	66,494	1929	156	89	93
1930	4,468	2,536	60,458	1930	201	118	85
1931	4,385	3,813	49,075	1931	197	177	69
1932	5,433	3,981	38,401	1932	244	185	54
1933	6,557	4,932	34,475	1933	295	229	48
1934	9,284	5,798	39,290	1934	418	269	55
1935	9,279	‡4,911	‡34,335	1935	417	‡228	‡48

* Mechanical loading underground includes coal handled on pit-car loaders, on hand-loaded face conveyors, and by mobile loaders, duckbills and scrapers. † As reported by the Commonwealth of Pennsylvania, Department of Mines. ‡ Preliminary.

TABLE 2—PENNSYLVANIA ANTHRACITE LOADED MECHANICALLY UNDERGROUND, 1927-35

Year	Scrapers and mobile loaders		Conveyors and pit-car loaders *		Total loaded mechanically	
	Number of units	Net tons loaded	Number of units	Net tons handled	Number of units	Net tons handled
1927†	305	‡	159	‡	464	2,223,281
1928†	302	‡	184	‡	486	2,351,074
1929	350	2,450,279	355	1,019,879	705	3,470,158
1930	384	2,927,088	421	1,540,662	805	4,467,750
1931	462	2,462,370	576	1,922,410	1,038	4,384,780
1932	490	2,651,591	859	2,781,749	1,349	5,433,340
1933	464	2,395,403	965	4,161,864	1,429	6,557,267
1934	531	3,017,741	1,376	6,266,745	1,907	9,284,486
1935	508	2,662,026	1,615	6,617,031	2,123	9,279,057

* Includes duckbills and other self-loading conveyors, which account for only a small part of the total. † As reported by the Commonwealth of Pennsylvania, Department of Mines. ‡ Not separately reported, see total.

Scrapers and mobile loaders declined from 3,017,741 tons in 1934 to 2,662,026 tons in 1935; however, mobile loaders are not an important factor in the anthracite region. Conveyors, including hand-loaded face conveyors and duckbills, increased from 6,203,639 to 6,556,986 tons, an increase of 5.7 percent.

Mechanical loading declined 264,294 tons in the northern field and 8,356 tons in the eastern middle field, but increased 243,591 tons in the western middle field and 23,630 tons in the southern field.

Tables 1, 2, 3, and 4 contain the statistical record for mechanical loading in the Pennsylvania anthracite region for 1935.

Mechanical Loading in Bituminous Coal Mines

In 1935, 47,206,477 tons were loaded mechanically in underground mines. This total fell just short of the 47,562,108 tons loaded in 1931; however, in 1935, 13.6 percent of deep-mined coal was mechanically loaded, whereas in 1931 the percentage was 13.1. Also in 1935, 52.3 percent of the tonnage was loaded by mobile loaders, whereas in 1931 mobile loaders accounted for 40.8 percent of the tonnage. Since mobile loaders represent a much higher degree of mechanization than pit-car loaders, the year 1935 can therefore be considered as one of the most significant years in the development of mechanized loading. However, present information indicates that 1936 will easily overshadow 1935. Table 5 shows the relative growth of mechanical loading, surface stripping, and hand loading from 1927 to 1935.

Mechanical Loading by Types of Equipment.—Mobile loaders have been increasing in use in recent years. The percentage of coal loaded by mobile loaders to all coal mechanically loaded was 47.2 percent in 1933, 50 percent in 1934, and 52.3 percent in 1935. Pit-car loaders are next in order of importance in view of the tonnage loaded, but the percentage by pit-car loaders has declined from 30.2 percent in 1933 to 26.8 in 1934, and

TABLE 3—CHANGE IN TONNAGE OF ANTHRACITE LOADED BY PRINCIPAL TYPES OF MACHINES, 1934-35, NET TONS

	1934	1935	Increase (+) or decrease (—), 1935 Net tons	Percent
Scrapers and mobile loaders*	3,017,741	2,662,026	—355,715	—11.8
Pit-car loaders	63,106	60,045	— 3,061	— 4.9
Hand-loaded face conveyors†	6,203,639	6,556,986	+353,347	+ 5.7
Total	9,284,486	9,279,057	— 5,429	— 0.1

* Coal loaded by mobile loaders was a very small percentage of the total in 1934 and 1935.
† Shaker chutes, etc., including those equipped with duckbills.

TABLE 4—ANTHRACITE HANDLED BY SCRAPERS AND MOBILE LOADERS AND BY ALL TYPES OF CONVEYORS IN 1935, BY FIELDS, IN NET TONS

Field	Scraper loaders	Pit-car loaders	Hand-loaded face conveyors*	Total mechanically loaded underground
Northern	2,169,149	34,806	5,227,363	7,416,776
Eastern Middle	91,814		321,930	428,286
Western Middle	371,078	25,239	866,197	1,242,705
Southern	†29,985		141,496	191,290
Total	2,662,026	60,045	6,556,986	9,279,057

* Shaker chutes, etc., including those equipped with duckbills. † Include tonnage by mobile loaders.

TABLE 5—RELATIVE GROWTH OF MECHANICAL LOADING, HAND LOADING, AND STRIPPING IN BITUMINOUS COAL MINES, 1927-35

(Mechanical loading includes coal handled on pit-car loaders and hand-loaded face conveyors)

Year	Mechanical loading underground	Stripping	Hand loading underground	Year	Mechanical loading underground	Stripping	Hand loading underground
Thousand net tons:				Index numbers:			
1927	*16,500	18,378	482,885	1927	100	100	100
1928	21,559	19,789	459,397	1928	131	108	95
1929	37,862	20,286	476,859	1929	230	110	99
1930	46,982	19,842	400,702	1930	285	108	83
1931	47,562	18,932	315,595	1931	288	103	65
1932	35,817	19,641	254,252	1932	217	107	53
1933	37,820	18,270	277,541	1933	229	99	57
1934	41,433	20,789	297,146	1934	251	113	62
1935	47,206	†23,400	†298,718	1935	286	†127	†62

* Complete returns were not collected in 1927, but the total has been estimated from the complete surveys made in 1926 and 1928. † Preliminary.

TABLE 6—TONNAGE OF BITUMINOUS COAL LOADED MECHANICALLY UNDERGROUND IN 1935

	Net tons	Percent
Loaded by machine:		
Mobile loading machines	24,675,248	86.9
Scraper loaders	1,118,201	3.9
Duckbills and other self-loading conveyors	2,594,564	9.2
Total loaded by machine	28,388,013	100.0
Handled by conveyors:		
Duckbills and other self-loading conveyors	2,594,564	12.1
Pit-car loaders	11,098,466	51.8
Other hand-loaded conveyors	7,719,998	36.1
Total handled by conveyors	21,413,028	100.0
Recapitulation, less duplications:		
Mobile loading machines	24,675,248	52.3
Scraper loaders	1,118,201	2.4
Pit-car loaders	11,098,466	23.5
Other conveyors, including duckbills	10,314,562	21.8
Grand total, loaded mechanically	47,206,477	100.0

dropped to 23.5 in 1935. The percentage for hand-loaded face conveyors has increased from 15.6 percent in 1933 to 15.7 in 1934 and 16.4 in 1935. Duckbills and other self-loading conveyors have a more limited geographical use, and therefore any changes represent local conditions from and for coal from a particular area rather than changes in the use of duckbills. The same is true for scrapers; however, they do have a more widespread geographical use. The percentage by scrapers was 2.6 in 1933 and 2.4 in 1935.

Table 6 shows the tons loaded by types in 1935, and Table 7 shows the changes by types in 1935 compared with 1934.

Mobile Loaders.—This type of loading equipment was reported in use in 15 bituminous coal-producing states in 1935, compared with 10 in 1934. In 1935, 24,675,248 tons were handled by mobile loaders. The northern group of states (Illinois, Indiana, Ohio, and Pennsylvania) account for 20,530,012 tons of this total, which represents an increase of 13.7 percent by mobile loaders for these states compared with 1934. In Alabama, Kentucky, Tennessee, Virginia, and West Virginia, mobile loaders handled 1,228,730 tons in 1935, an increase of 90.7 percent over 1934. The states west of the Mississippi River produced 2,913,506 tons by mobile loaders in 1935, an increase of 40.3 percent over 1934. These changes clearly indicate an increasing and more widespread use of mobile loaders. The number of mobile loading machines in use increased from 534 in 1934 to 657 in 1935. There was an increase of 82 in the northern states, 32 in the southern states, and 9 in the western states.

Pit-car Loaders.—Pit-car loaders handled 11,098,466 tons and were in use in 8 states in 1935, which compares with 11,088,919 tons in 10 states in 1934. The increase of only 9,547 tons, or one-tenth of 1 percent, indicates the declining use of pit-car loaders. Illinois recorded a very large increase (nearly 850,000 tons) handled by pit-car loaders, but this increase was offset by large declines, principally in Indiana and Kentucky, and by decreases in several other states. There were 2,288 pit-car loaders reported in use in 1934 and 2,098 in 1935. Even Illinois, which reported a gain in tonnage, had a net decline of 17 units in use. Indiana reported a decline of 66 units.

Hand-loaded Face Conveyors.—Conveyors handled 7,719,998 tons in 1935, a net gain of 1,212,242 tons, or 18.6 percent over 1934. The southern group of states account for 800,856 tons of this increase, the states west of the Mississippi account for 454,886 tons increase, while the northern group of states decreased 43,500 tons. The number of mines having conveyor installations increased from 114 in 1934 to 136 in 1935. West Virginia and Kentucky each reported 6 more conveyor mines in 1935, and Arkansas, 5 more.

Duckbills and Other Self-loading Conveyors.—These are used principally in Wyoming, and therefore changes in total production in that state have an important bearing on the tonnage handled by this type. In 1934, 157 duckbills were in use, and in 1935, 179, all of the increase occurring in Wyoming. Duckbills were in use in 7 states in 1934 and 1935.

Scrapers.—The tonnage loaded by scrapers was 1,004,480 tons in 1934 and 1,118,201 tons in 1935, an increase of 113,721 tons. The southern group of states increased its output of scraper-loaded coal by 194,003 tons, chiefly due to the increase in Alabama. The western states increased 56,487 tons (principally in Wyoming), while the northern states reported a decline of 136,769 tons.

Rank of States in Percent of Mechanized Loading.—The importance of mechanical loading for any state can be viewed by the tonnages loaded or by considering the percentage of deep-mined output which was mechanically loaded. The latter is a good indicator because it evaluates changes in methods of production. Table 8 gives the percent of deep-mined output which was mechanically loaded by states.

TABLE 7—COMPARATIVE CHANGE IN TONNAGE LOADED BY PRINCIPAL TYPES OF MACHINES, 1934-35

	1934 Net tons	1935 Net tons	Increase (+) or decrease (—), 1935 Net tons	Percent
Mobile loading machines	20,759,534	24,675,248	+3,925,714	+18.9
Scraper loaders	1,004,480	1,118,201	+ 113,721	+11.3
Duckbills and other self-loading conveyors	2,082,046	2,594,564	+ 512,518	+24.6
Total loaded by machines	23,836,060	28,388,013	+4,551,953	+19.1
Pit-car loaders	11,088,919	11,098,466	+ 9,547	+ 0.1
Other hand-loaded conveyors	6,507,756	7,719,998	+1,212,242	+18.6
Grand total	41,432,735	47,206,477	+5,773,742	+13.9

TABLE 8—PERCENT OF TOTAL BITUMINOUS DEEP-MINED OUTPUT MECHANICALLY LOADED, 1933-35

(Figures show proportion of the total production from underground mines that was loaded by machine or handled on pit-car loaders and other hand-loaded conveyors)

State	1933	1934	1935*	Change (in points) 1935 over 1934
Wyoming	75.8	84.1	90.3	+6.2
Montana	79.5	79.1	69.9	—9.2
Indiana	48.6	61.4	63.8	+2.4
Illinois	53.9	52.6	56.4	+3.8
Utah	20.6	24.9	30.1	+5.2
Arkansas	17.0	25.1	28.3	+3.2
Washington	19.4	24.6	27.3	+2.7
Alabama	16.0	11.8	15.6	+3.8
Ohio	5.5	5.8	8.0	+2.2
Pennsylvania	8.5	7.3	7.1	— .2
Virginia	4.5	4.1	6.6	+2.5
Tennessee	†	†	6.2	..
Colorado	1.4	1.3	3.4	+2.1
West Virginia	.8	1.4	2.1	+ .7
Kentucky	2.2	1.9	1.3	— .6
United States	12.0	12.2	13.6	+1.4

* Preliminary, based on final figures for loading and preliminary figures for deep-mined coal.
† Concealed to avoid disclosing the results of individual operations.

Changes by Groups of States.—It is convenient to group all states having mechanical loading into three divisions, in order to show changes according to geographical distribution. The northern states (Illinois, Indiana, Ohio, and Pennsylvania) reported 31,569,409 tons loaded in 1934 and 34,238,566 tons in 1935, an increase of 2,669,157 tons, or 8.5 percent. The southern group of states (Alabama, Kentucky, Maryland, Tennessee, Virginia, and West Virginia) reported 3,743,281 tons in 1934 and 4,947,414 tons in 1935, an increase of 1,204,133 tons, or 32.2 percent. The western group of states (all west of the Mississippi River) reported 6,120,045 tons in 1934 and 8,020,497 tons in 1935, an increase of 1,900,452 tons, or 31.1 percent.

Northern States.— Illinois accounted for 43.5 percent of all the coal mechanically loaded in the United States in 1935. Its output of mechanically loaded coal has been increasing consistently in recent years. The same is true for Indiana and Ohio. In Pennsylvania, however, each year since 1932 has shown a decline. These four northern states reported 76.2 percent of the total mechanical loading in 1934 and 72.5 percent in 1935.

Southern States.—Each of the states included in the southern group reported increases in 1935, except Kentucky. The six southern states reported 9 percent of the total mechanical loading in 1934 and 10.5 percent in 1935.

Western States.—This group contains the two most highly mechanized coal-producing states. In degree of mechanization, Wyoming is outstanding. Its percentage of deep-mined output mechanically loaded has risen from 66.3 in 1932 to 90.3 in 1935. Montana reported 69.9 percent in 1935. These ten western states reported 14.8 percent of the total mechanical loading in 1934 and 17 percent in 1935.

Total Production at Mines Using Mechanical Loading.—Total production at mines using mechanical loading equipment was 86,548,920 tons in 1935 compared with 71,505,236 tons in 1934. These relative figures indicate that the probable increase of mechanically loaded coal in 1936 will exceed the increase for 1935.

Mechanical Cleaning of Bituminous Coal in 1935

MECHANICAL cleaning of bituminous coal reached the all-time high of 45,361,021 tons in 1935. The ratio of mechanically cleaned coal to total bituminous production has risen consistently year by year from 5.3 percent in 1927 to 11.1 percent in 1934 and to 12.3 percent in 1935. The output of all coal produced at mines served by cleaning plants was 23.6 percent of the national production. The totals for 1935, as given in Tables 1 to 5, are final, but are subject to slight revision before publication in final printed form. Where percent of output mechanically cleaned in 1935 is given, preliminary totals have been used for state and national production of bituminous coal. The figures are based on reports courteously furnished to the Bureau of Mines by operating companies. Manufacturers of cleaning equipment have cooperated to make the data complete. Totals for 1934 are given for comparison.

TABLE 1—BITUMINOUS COAL MECHANICALLY CLEANED BY WET AND PNEUMATIC METHODS, 1934-35, IN NET TONS OF CLEAN COAL

	1934	1935	Increase (+) or decrease (—), 1935 Net tons	Percent
By wet methods:				
At the mines	27,555,730	31,006,643	+3,450,913	+12.5
At central washeries operated by consumers	3,972,845	5,849,845	+1,877,000	+47.2
Total wet	31,528,575	36,856,488	+5,327,913	+16.9
By pneumatic methods	8,297,984	8,504,533	+ 206,549	+ 2.5
Grand total	39,826,559	45,361,021	+5,534,462	+13.9

Important Changes in 1935.—Comparing 1935 with 1934, the outstanding changes were as follows:

In 1935, 45,361,021 tons were cleaned, an increase of 5,534,462 tons, or 13.9 percent. (See Table 1.)

Coal cleaned by wet methods equalled 36,856,488 tons, an increase of 5,327,913 tons, or 16.9 percent; whereas coal cleaned by pneumatic methods increased only 206,549 tons, or 2.5 percent. (See Table 2.)

TABLE 2—CLASSIFICATION BY TYPES OF EQUIPMENT USED IN CLEANING BITUMINOUS COAL, 1934-35

(Coal cleaned at central washeries operated by consumers in Colorado and Pennsylvania is included)

	Net tons of clean coal		Increase (+) or decrease (—), 1935		Percent cleaned by each type	
	1934	1935	Net tons	Percent	1934	1935
Wet methods:						
Jigs	*14,012,058	15,735,039	+1,722,981	+12.3	*35.2	34.7
Concentrating tables†	1,116,154	1,117,789	+ 1,635	+ 0.1	2.8	2.5
Jigs in combination with concentrating tables†	* 1,227,413	1,549,422	+ 322,009	+26.2	* 3.1	3.4
Launders and upward-current classifiers	15,167,450	18,454,238	+3,286,788	+21.7	38.1	40.7
Unspecified	5,500	.....	— 5,500	.....	0.0	.....
Total wet	31,528,575	36,856,488	+5,327,913	+16.9	79.2	81.3
Pneumatic methods	8,297,984	8,504,533	+ 206,549	+ 2.5	20.8	18.7
Grand total	39,826,559	45,361,021	+5,534,462	+13.9	100.0	100.0

* Information obtained in 1935 indicated that one of the plants classed as using jigs only in 1934 was actually using jigs in combination with concentrating tables. The figures for 1934 have been revised accordingly.

† A more representative figure for the use of wet tables is indicated by combining the totals for concentrating tables with the total for jigs in combination with concentrating tables. This shows a wet gain of 323,644 tons, or 13.8 percent for 1935.

TABLE 3—TOTAL PRODUCTION OF ALL COAL AT MINES WITH CLEANING PLANTS, 1934-35, IN NET TONS

(Does not include any estimate for mines that may ship to consumer operated plants)

			Increase (+) or decrease (—), 1935	
	1934	1935	Net tons	Percent
Wet methods:				
Jigs	*29,820,788	34,892,156	+ 5,071,368	+17.0
Concentrating tables	1,868,541	1,490,635	— 377,906	—20.2
Jigs in combination with concentrating tables	* 1,532,938	1,771,351	+ 238,413	+15.6
Launders and upward-current classifiers	31,440,627	37,768,410	+ 6,327,783	+20.1
Unspecified	33,853	.....	— 33,853	.....
Total wet	64,696,747	75,922,552	+11,225,805	+17.4
Pneumatic methods	20,080,018	24,030,553	+ 3,950,535	+19.7
Grand total	84,776,765	99,953,105	+15,176,340	+17.9
Less duplication†	8,467,603	12,786,859	+ 4,319,256	+51.0
Net total	76,309,162	87,166,246	+10,857,084	+14.2
United States production of bituminous coal	359,368,022	‡369,324,000	‡+ 9,956,000	‡+ 2.8
Percent produced at mines with cleaning plants	21.2	23.6		

* See Table 2, footnote *. † Mines using both wet and pneumatic methods. ‡ Preliminary.

TABLE 4—CLEANING PLANTS, CLASSIFIED BY TYPES, IN ACTUAL OPERATION, 1934-35

	1934	1935
Wet types:		
Jigs	*129	138
Concentrating tables	10	9
Jigs in combination with concentrating tables	* 13	15
Launders and upward-current classifiers	86	93
Unspecified	1	...
Total wet	239	255
Pneumatic types	53	65
Total, all types	292	320
Number of plants using both wet and pneumatic types	24	32

* See Table 2, footnote *.

TABLE 5—BITUMINOUS COAL MECHANICALLY CLEANED BY WET AND PNEUMATIC METHODS, BY STATES, 1934-1935

(Coal cleaned at central washeries operated by consumers in Colorado and Pennsylvania is included)

State	Clean coal in net tons		Increase (+) or decrease (—), 1935		Percent of state output mechanically cleaned	
	1934	1935	Net tons	Percent	1934	*1935
Alabama	7,150,888	6,841,269	— 309,619	— 4.3	78.2	81.3
Colorado	417,295	492,874	+ 75,579	+ 18.1	8.0	8.4
Illinois	1,195,588	3,154,128	+1,958,540	+163.8	2.9	7.2
Indiana	1,127,654	1,283,555	+ 155,901	+ 13.8	7.6	8.3
Kansas and Missouri	813,488	1,169,351	+ 355,863	+ 43.7	13.9	19.2
Kentucky	308,735	351,568	+ 42,833	+ 13.9	.8	.9
Michigan and Ohio	1,260,654	1,151,546	— 109,108	— 8.7	5.9	5.4
Pennsylvania	15,652,268	17,844,642	+2,192,374	+ 14.0	17.4	19.7
Tennessee	341,530	341,117	— 413	— .1	8.3	8.3
Virginia	515,810	389,548	— 126,262	— 24.5	5.5	3.9
Washington	400,336	614,771	+ 214,435	+ 53.6	28.9	39.0
West Virginia	10,486,956	11,613,813	+1,126,857	+ 10.7	10.7	11.8
Other states†	155,357	112,839	— 42,518	....	....	....
Total	39,826,559	45,361,021	+5,534,462	+ 13.9	11.1	12.3

* Preliminary, based on final totals for cleaning and preliminary estimates for state totals and total production for United States in 1935.

† For 1934 includes Arkansas, Maryland, Montana, New Mexico and Oklahoma.
For 1935 includes Arkansas, Maryland, Montana and New Mexico.

Classification of Tonnage Cleaned by Types of Equipment.—The amount of coal cleaned by launders and upward current classifiers has increased consistently each year from 1,000,000 tons in 1927 to 15,167,450 tons in 1934 with a further rise to 18,454,238 tons in 1935. This represented a gain of 3,286,788 tons, or 21.7 percent over 1934. Rheolaveur launders, Menzies hydroseparators, and Chance cones are the three principal types included in the group of launders and classifiers. Coal cleaned by the new chloride washers is included in the group of launders and classifiers. The first tonnage cleaned in chloride washers was reported by two companies in the low-volatile fields of southern West Virginia.

Coal cleaned by jigs in 1935 amounted to 15,735,039 tons, an increase of 1,722,981 tons, or 12.3 percent over 1934. The tonnage cleaned in Baum type jigs has been increasing consistently each year since they were first introduced in this country.

The increase of only 1,635 tons of coal cleaned on wet concentrating tables is not representative of the use of tables in 1935, because one plant which reported tables only in 1934, reported jigs and tables in 1935, and accordingly its tonnage is classed with jigs and tables in 1935. A more representative indication of the use of wet tables is shown by combining the 1,117,789 tons cleaned by tables only with the 1,549,422 tons reported as cleaned by jigs in combination with tables. This gives a total of 2,667,211 tons in 1935, a net gain of 323,644 tons, or 13.8 percent over 1934. One table plant which operated in 1934 was idle in 1935. Another mine abandoned the use of wet tables during 1935, replacing these with pneumatic equipment.

The tonnage cleaned by pneumatic methods did not increase in the same proportion as by wet methods. Over 93 percent of the tonnage pneumatically cleaned was handled at mines in Pennsylvania, Virginia, and West Virginia, and most of this tonnage was cleaned on tables. The tonnage dry cleaned in these three states was practically the same in 1935 as in 1934; however, air cleaning in Illinois, Indiana, Kentucky, Montana, Ohio, and Washington, while not large (about 500,000 tons total), showed an increase of 40 percent in 1935 compared with 1934. Total tons cleaned by air tables declined, whereas coal cleaned by other types of air-cleaning equipment increased.

Total production of coal at mines served by mechanical cleaning plants increased 14.2 percent, but production of all bituminous coal in the United States was only 2.8 percent higher. (See Table 3.)

The number of plants in operation in 1935 was 320, compared with 292 in 1934. (See Table 4.)

Pennsylvania, Illinois, and West Virginia showed the largest gains in tonnage cleaned, and Illinois, Washington, Kansas, and Missouri showed the largest percentage gains. (See Table 5.)

Cleaning at the Mines and at Consumer-operated Washeries.—Coal cleaned at the mines increased from 35,853,714 tons in 1934 to 39,511,176 tons in 1935, an increase of 3,657,462 tons, or 10.2 percent. These totals include coal cleaned at the mines as well as coal cleaned at central washeries operated either by coal companies or by custom washeries.

Coal cleaned at central washeries operated by steel companies amounted to 5,859,845 tons, an increase of 1,877,000 tons, or 47.2 percent over 1934. Nearly all of the coal included in these figures was cleaned at washeries operated by steel companies in Pennsylvania. The production of pig iron in Pennsylvania was 29 percent higher in 1935. Pig iron production and coal washed at these consumer plants are intimately related. The increase in pig iron production was reflected by the large increase in coal washed at consumer plants.

TABLE 6—METHOD OF MINING AT MINES SERVED BY CLEANING PLANTS

	1934 Net tons	1935 Net tons	Increase (+), 1935 Net tons	Increase (+), 1935 Percent
Total production at mines with cleaning plants	76,309,162	87,166,246	+10,857,084	+14.2
Method of mining:				
Mined from strip pits	7,127,710	9,314,425	+ 2,186,715	+30.7
Mechanically loaded underground	10,128,745	15,065,777	+ 4,937,032	+48.7
Hand loaded underground	59,052,707	62,786,044	+ 3,733,337	+ 6.3

Mechanical Cleaning, Surface Stripping, and Mechanical Loading Underground.—The growing importance of mechanical cleaning at stripping operations and at mines using mechanical loading underground is indicated by comparing the results for 1934 and 1935 given in Table 6.

Uses of Mechanically Cleaned Coal.—In 1927, 37.4 percent of mechanically cleaned coal was used in making coke. As steel operations fell off during the depression, this percentage declined to 22.8 in 1932, but with increasing activity in the steel industry, this percentage rose to 24.8 in 1934 and 26.3 in 1935.

Coordinating Health Conservation With Safety

(*Continued from page* 30)

tremely low mortality and morbidity rate among mothers and babies.

In addition to our medical units, serving approximately 12,000 people, we have a modern 60-bed hospital fully equipped to perform any type of major or minor operation. In this hospital we are equipped with X-ray and pathological laboratories; these adjuncts themselves have saved the company considerable money and have been of invaluable service to our employes and their families, particularly in the matter of compensable injuries and contagious diseases.

Our laboratory enables us to isolate such bacteria as tuberculosis, syphilis, typhoid, gonorrhea, meningitis, pneumonia, and streptococci infections.

A further advantage, particularly to the company as well as the community, is afforded by the laboratory in analyzing an acute or inflamed eye, which the patient may claim has been caused by an occupational injury. Upon examination of eye smears, we find that in many cases the patient is suffering from an acute gonorrheal infection, which might have resulted in unreasonable cost to the company, probably the loss of the eye to the patient and possibly other infected cases in the community.

As a therapeutic agent our laboratory serves in two capacities, (a) in the preparation of autogenous vaccine, the matching and typing and preparation of blood for transfusions; (b) the accurate compounding or mixing of drugs and chemicals, for example, (1) a patient is suffering of boils, a culture can be made from the specific causative bacteria and a vaccine made that is often beneficial; (2) our glucose and salino, for example, is accurately weighed and prepared in our own laboratory. We have used these preparations as furnished by our laboratory for the past eight years, and results have been unusually successful.

While we have not completed our survey 100 percent, we have gone so far as to conclude definitely that the reason for the apparent lowered resistance among our employes and the primary reason why the incidence of illness, particularly having to do with the respiratory organs, is abnormally high, can be attributed largely to the presence of parasites as heretofore indicated. We know that we have a general public health problem to solve in this particular community, and that the problem can be met not alone by proper treatment and medication but by general education on the part of our medical staff, public health nurses, and our school system.

We firmly believe that the conservation of health among miners in the coal industry is as important to the industry as is the purchase and efficient operation of its mechanical equipment which is primarily designed and installed to reduce operating costs and promote safety.

Blasting Problems in Anthracite Mines

(*Continued from page* 32)

missibles and grades of dynamite in each magazine and the number of cases of each code marking; they have no key to the codes, but simply send in their report to the explosives engineer, who furnishes them with a control sheet showing which codes are to be moved first. When any code gets beyond the three-month limit, it may be ordered out of the magazine and used on a stripping job, where it offers no hazard in use because of the large diameter hole and its general use in the overburden. At other times, small quantities of explosives have been destroyed to eliminate the possibility of using them underground.

The use of permissible explosives exclusively in coal and control of sensitiveness of permissible explosives by the crimped-end, halved-cartridge gap test has resulted in almost complete elimination of reports of explosives burning in holes, fewer gas ignitions assigned to explosives, and consequently a most substantial reduction in the hazard of mine fires caused by explosives.

Coal Operators Committees Meet

(*Continued from page* 33)

D. E. Renshaw, Westinghouse Electric & Manufacturing Company.

H. A. Randall, Harwick Coal & Coke Company.

Bruce G. Shotton, Hendrick Manufacturing Company.

G. B. Southward, American Mining Congress.

Frank G. Smith, Poston Consolidated Coal Company.

J. A. Saxe, Industrial Collieries Corporation.

E. A. Siemon, Hillman Coal & Coke Company.

J. J. Sellers, Virginia Iron, Coal & Coke Company.

L. H. Schnerr, Consolidation Coal Company.

F. L. Stone, General Electric Company.

Charles E. Vawter, The Gauley Mountain Coal Company.

J. C. Wilson, Ohio Brass Company.

Charles C. Whaley, Myers-Whaley Company.

J. Ray Ulrich, Bethlehem Steel Company.

D. D. Wilcox, Superior Coal Company.

News and Views

of Interest to Mining Men

● THE Oliver Iron Mining Company, subsidiary of the United States Steel Corporation, has made extensive plans for winter operations. Recently a meeting of the general superintendents of this company was held at their offices in Duluth. The entire district was represented and the program for the winter discussed.

● APPROVAL of the Colorado unemployment compensation law as meeting the requirements of title IX of the Social Security Act was announced November 28 by the Social Security Board. The law was passed November 20.

Colorado is the seventeenth state (including the District of Columbia) in which employers subject to the Federal tax on employers of eight or more persons, established by the Social Security Act, may get credit, up to 90 percent of that tax, for contributions made to their state unemployment compensation funds for employment as defined for the purposes of the Federal tax. The other states with approved laws are Alabama, California, Idaho, Indiana, Louisiana, Massachusetts, Mississippi, New Hampshire, New York, Oregon, Rhode Island, South Carolina, Texas, Utah, Wisconsin, and the District of Columbia. The Colorado law applies to employers of eight or more employes and will be administered by the Industrial Commission. It is of the "pool-fund" type and provides for contributions only by employers, beginning December 1, 1936. The first contribution will be 10.8 percent of the pay roll for December, provided that the total tax payable is not greater nor less than 0.9 percent for the whole year. Thereafter the rates of contribution will be 1.8 percent in 1937 and 2.7 in 1938, 1939, 1940, and 1941. After 1941 the law provides for a merit rating which allows employers with good records of employment to contribute less to the pooled fund than employers whose workers are frequently discharged.

The benefits provided by the law are 50 percent of the full-time weekly wage, with a maximum of $15. If the full-time weekly wage is less than $10, benefits will be paid at the rate of 70 percent of wages, but not to exceed $5. The maximum duration of these benefits will be 13 weeks, with a provision for partial benefits. Benefits will be payable on or after January 1, 1939.

● THE UNITED MINE WORKERS of America have purchased the six-story University Club in the city of Washington as a permanent office. This building is located at 15th and Eye Streets, N. W., across the street from the Veterans' Bureau and two blocks from the White House. The price paid was $275,000.

● THE NORTHWEST MINING ASSOCIATION held its annual convention in Spokane, Wash., December 3, 4, and 5, with a registration of 500 mining men.

● THE Yavapai County Chamber of Commerce, Arizona, recently reported that from 1858 to 1934, inclusive, Arizona produced $2,844,154,126 worth of gold, silver, copper, lead, zinc, manganese, tungsten, and molybdenum, the largest item being copper production, which was approximately two and one-half millions. These figures were presented by H. R. Wood, member of the mining committee of the Chamber of Commerce, to an educational tour sponsored jointly by the University of Arizona and the Santa Fe Railroad.

● THE AMERICAN PETROLEUM INSTITUTE held its annual meeting at the Stevens Hotel, Chicago, Ill., November 9 to 12, inclusive.

● THE ANTHRACITE INSTITUTE, through C. J. Goodyear as counsel, filed a brief with the Interstate Commerce Commission on November 7 in protest against the examiners' recommendations that freight rates on "Virginia anthracite" should be reduced 25 cents a ton. Mr. Goodyear attempted to show, by convincing evidence, that the present rate is not excessive; that the per ton mile to Baltimore at the present rate is 10.1 mills, while that on Pennsylvania anthracite is 13.8 mills.

● THE NATIONAL ASSOCIATION OF PURCHASING AGENTS has estimated that the demand in January, 1937, for bituminous coal will approximate 12,000,000 tons per week.

● THE NATIONAL FOOD BROKERS' ASSOCIATION has recently published a pamphlet on the purpose of the Robinson-Patman, which presents an analysis of this law by Dr. Melvin T. Copeland, noted economist and professor of marketing at the Harvard Graduate School of Business Administration.

● MEMBERS at large of the Mining Section of the National Safety Council for 1937 are P. M. Arthur, American Zinc Company; John L. Boardman, Anaconda Copper Mining Company; H. T. Harper, Tennessee Copper Company; and H. C. Henrie, Phelps-Dodge Corporation.

● THE Snyder Mining Company, of Minnesota, is building a new ore pressure plant at its Virginia mine near Eveleth. The plant is said to have a capacity of 3,000 tons per day and will be ready to enter service in May, 1937.

● MINNESOTA iron mining companies paid $5,836,286.80, covering its second half taxes, on October 31. According to *Skillings Review*, some of the companies withheld taxes due on certain properties now involved in litigation. Several companies operating in St. Louis County paid the full first half taxes under protest.

● AT THE Congress of American Industry sponsored by the National Association of Manufacturers, held at the Waldorf-Astoria, December 9 and 10. three keynoters were presented: C. M. Chester, General Foods Corporation; E. T. Weir, National Steel Corporation; and Louis H. Brown, Johns-Mansville Corporation. S. Clay Williams, of the R. J. Reynolds Tobacco Company, served as chairman of the resolutions committee.

● THE EAGLE-PICHER LEAD COMPANY and its subsidiary, the Eagle-Picher M. & S. Company, have raised base wages of mine, mill, and smelter employes in the Tri-State District 25 cents per day. It is understood that other Tri-State producers have followed this example. Through this action, the weekly pay roll for about 5,000 employes was raised about $10,000.

● THE thirty-seventh annual convention of the International Acetylene Association was held in St. Louis, Mo., in November. A topic discussed there of interest to both coal and metal mining was "Acetylene Welding Practice." G. S. Jenkins, general superintendent of the Consolidated Coal Company, at St. Louis, and H. R. Wass, St. Joseph Lead Company, Bonne Terre, Mo., presented papers upon this topic, at the Heavy Industries Session, at which Julian D. Conover, Secretary, American Mining Congress, presided.

● CONSUMERS' COOPERATIVES are causing great concern in the coal mining field. Thirteen national trade associations recently presented their views on this subject to President Roosevelt. They pointed out: "We believe an unintended injustice is being done privately owned enterprises by the preferential treatment being given this type of business organization."

● THE strike in Utah's mining industry has been called off as a result of a promised pay increase of 25 cents a day offered by the leading companies in the district.

● UNITED STATES SMELTING, REFINING & MINING COMPANY, Park Utah Consolidated Mines Company, and Silver King Coalition Mines Company recently posted notices of such increase, and Tintic Standard Mining Company and International Smelting Company have agreed to a like wage.

● THE HOOVER Medal for 1936 (awarded for distinguished public service by an engineer) has been awarded to Ambrose Swasey, an honorary member of the American Society of Civil Engineers. Herbert Hoover is the only other person to whom it has been awarded. The presentation took place on December 2, 1936, at the Hotel Astor, in New York City, at the annual banquet of the American Society of Mechanical Engineers, which was dedicated to the medalist.

● ACCORDING to the United States Bureau of Mines, mechanical cleaning of bituminous coal reached an all-time high of 45,361,021 tons in 1935. This is an increase of 13.9 percent over 1934 and represents approximately 12.3 percent of the total production. There were 320 cleaning plants in operation in 1935. Alabama showed the largest percentage of mechanically cleaned coal with a record of 81.3 percent. Pennsylvania led in actual tonnage cleaned with a record of 17,844,642 tons. West Virginia cleaned 11,613,813 tons; of the total amount cleaned 36,856,437 tons were cleaned by the wet method and 8,504,533 tons were cleaned by the pneumatic method.

● AT A MEETING of the board of directors of the Allegheny River Mining Company held November 18, 1936, Chas. M. Shoffner was elected president, effective December 1, 1936, succeeding R. M. Shepherd, who resigned to devote his entire time to his duties as president of The Pittsburg & Shawmut Railroad Company.

Mr. Shoffner will continue his connections as president of the Ringgold Coal Company, with general offices at Timblin, Pa., and mines on the Pittsburg & Shawmut Railroad at Ringgold No. 1 and Ringgold No. 2 (formerly Sunnyside mine of the Markle-Bullers Coal Company), and president of the Reid Coal Company, with general offices at Timblin, Pa., and mines on The Pittsburg & Shawmut Railroad at Colwell, Pa.

The general office of the Allegheny River Mining Company will be continued at Kittanning, Pa., and the production of its mines, Cadogan, Mohican, and Chickasaw, on the Pittsburg & Shawmut Railroad, will as heretofore be marketed through its sole sales agency and subsidiary, the Pittsburg & Shawmut Coal Company. Finance and Fuel Corporation, of Du Bois, Pa., of which Charles Waldron is president, are exclusive sales agents for the Ringgold Coal Company and the Reid Coal Company, having sold their production for a number of years.

The annual productive capacity of bituminous coal of the mines and selling organizations, unified as a result of the new connections, is in excess of 2,000,000 tons. The newly elected president stated that it is anticipated that there will be developed from this association close operating and sales effort to better serve the requirements of the consumer with a wider range of sizes and grades of coal, and constant attention and prompt service.

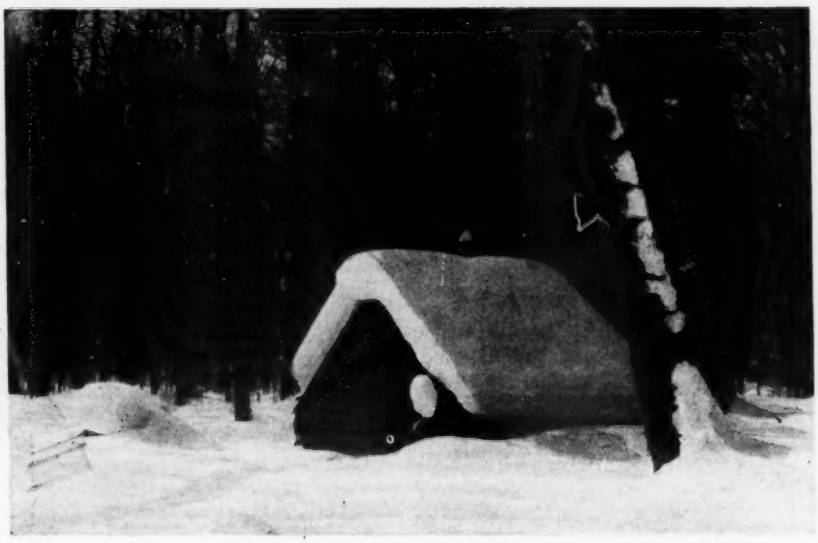
● THE "Mines Register and Metal Handbook" for 1937 will list and describe about 10,000 copper, gold, silver, lead, zinc, and other nonferrous metal mining companies in North and South America, giving the history and development of the company, a geological report on the property, a description of its equipment and machinery, its production record for a number of years, its financial report over a period of years, the names of the officers of the company, its headquarters and branches, and the names of the operating officials. Special sections will contain nonferrous metal statistics on production, consumption, and prices of gold, silver, copper, lead, zinc, aluminum, quicksilver, etc.; also a list of consulting mining engineers. A comprehensive list of manufacturers and suppliers of equipment and machinery used in mining operations will also be included. It will consist of about 2,000 pages. The book is published by the Atlas Publishing Company, Inc., New York, publishers for more than 30 years of the *Daily Metal Reporter*.

● SUNSHINE MINING CO.'S new four-compartment shaft is down nearly 2,200 ft., and will go 100 ft. deeper at the present time. It already is being used for hauling timber, which relieves the old shaft of that much labor. As the ore is coming out of the old shaft, it is now possible to increase production. This company is said to be producing nearly 1,000,000 oz. of silver per month and to be making a profit of more than twice the 50-cent quarterly dividend it is paying.

● AMERICAN ZINC CO. is making good progress in driving its 8 x 8-ft. tunnel into the property of Metaline Mining & Leasing Co., at Metaline Falls, Wash. The zinc company has an option on a controlling interest in the other company. The tunnel will be nearly 1 mile long, and will pass under extensive diamond-drill explorations made by the zinc company in the last two years. D. I. Hays, of St. Louis, is in immediate charge of this work and has taken up his abode in Spokane. The tunnel is in about 2,000 ft. In October two shifts made 494 ft.

● BERYL METALS CO., of Spokane, has been incorporated to build a plant at Deary, Idaho, southwest of the Coeur d'Alenes. The company has a deposit of beryllium near that town. T. F. Seidenschwarz, of Deary, is president of the company.

● WAGES of all men employed in the producing mines of the Coeur d'Alenes, in Idaho, were raised 50 cents a day, beginning the third week in November. This is the direct result of the repeated increases in lead prices. The mines of the district have a basic wage rate and pay also a bonus on a sliding scale, determined by the price of lead. Employed in the mines of the four producing mines, the Bunker Hill, Federal, Hecla, and Sunshine, are 3,600 men, making a daily increase in wages of $1,800, equivalent to what will amount to an increase in a year, if sustained, of nearly $400,000. The men are employed from five to seven days a week. Under the advanced schedule miners receive $5.75 a day, shovelmen $5.25, common labor $5, and timbermen $6.25.



Trappers' Shack on Grand Island After a Heavy Snow Fall.

● HECLA MINING CO. will disburse its fourth dividend of the year December 18. The amount is 20 cents a share, or $200,000, a total for the year of $600,000 and a grand total of $21,505,000. The rate for the fourth quarter of the year is practically the same as the 15-cent rate paid in the second and third quarters, because the fourth was delayed more than a month. Hecla pays this dividend in addition to the heavy disbursements it is making in financing a large mill for the Polaris property, in addition to financing the Polaris deep development and in addition to paying its half of the cost of construction of a mill for the Star mine. The Star, a joint project of the Bunker Hill & Sullivan and the Hecla companies, is a 50-50 enterprise.

● SIDNEY NORMAN, for the past three years mining editor of the *Sun*, Vancouver, B. C., has accepted a similar position with the daily *Globe*, Toronto, one of Canada's oldest newspapers, recently acquired by C. George McCullagh and William Wright, well-known mining man and vice president of Lake Shore and Wright-Hargreaves mines, Kirkland Lake, Ontario. Mr. Norman began his mining experience in British Columbia's Slocan boom, over 40 years ago, and has since visited most of the important districts in the United States, Canada, and parts of Old Mexico and Alaska.

● THE University of Illinois announces the fourth short course in coal utilization which will be held at Urbana on May 25-27, 1937. It is expected that a detailed program will be available for distribution about April 1. Last year's short course was attended by 232 coal men from 18 different states. Prof. D. R. Mitchell, of the department of mining and metallurgical engineering, will be in charge of the course. Save these dates.

● FOR three consecutive months the production of coke has shown an advance over the preceding month. The total output of by-product and beehive coke for the month of October amounted to 4,307,849 tons, or 140,094 tons per working day, the highest rate recorded for the year. In comparison with September, the October rate increased 4.6 percent. The gain was in part attributable to continued activities in the iron and steel industry, where the October daily rate of production, amounting to 96,512 gross tons, was the highest attained since the early months of 1930. For the 10 months of 1936 coke production has amounted to 37,420,040 net tons, a gain of 31.3 percent over the corresponding period of 1935.

● WARNER COLLIERIES COMPANY recently opened three new mines, located in Ohio and West Virginia.

● ACCORDING to press dispatches, John L. Lewis, president of the United Mine Workers of America, and members of the Bituminous Coal Commission have held various conferences to discuss legislation to regulate the bituminous coal mining industry, which may be submitted to the next Congress. The mine workers sponsored the ill-fated Guffey coal bill which met defeat at the hands of the Supreme Court.

Replica of the Semicentennial Medal struck by the Berwind-White Coal Mining Company in Commemoration of Their Fiftieth Anniversary.

● AMONG the recent releases from the United States Bureau of Mines, Department of the Interior, are the following information circulars: "Gold Mining & Milling in the Black Mountains of Arizona," by E. V. Gardner; "The New Bureau of Mines' Southern Experiment Station at the University of Alabama," by Milton H. Fies; "Milestones in Mine Safety Legislation," by L. C. Ilsley; "Improved Permissible Flame Safety Lamps," by Messrs. Ilsley, Hooker and Coggeshall.

● THE POCAHONTAS FUEL COMPANY recently dedicated its new mine drainage system which is said to be the largest of its kind in the world. O. L. Alexander, president of the company, and a group of executives and industrial leaders inspected the 17-mile tunnel which drains five large properties.

● IT IS estimated that iron ore shipments from the Lake Superior District will this year exceed 46,000,000 tons, or a rate equal to that established in 1930.

● THE Youngstown mine of the H. C. Frick Coke Company was recently leased to the Bortz Coal Company, who expect to put the plant in operation early in 1937.

● ACCORDING to railroad data sheets, railroads in this country in 1935 bought 22 per cent of the total bituminous coal output, or a total of 81,420,000 tons.

● THE committees appointed by the Department of Labor to study the various phases of the silicosis problem have recently held a number of meetings to

● THE sales of gas oil, distillate fuel oil and residual fuel oil in the continental United States increased from 330,321,000 barrels in 1934 to 365,985,000 barrels in 1935, as reported to the Petroleum Economics Division of the Bureau of Mines, by petroleum refiners and marketers. The total for 1935 approached within 6 million barrels the peak demand established in 1929. Oil distributors delivered to domestic and foreign markets a total of 395,000,000 barrels of fuel oil in 1935 compared with 359,000,000 barrels in 1934 and 411,000,000 barrels in 1929.

PETER F. LOFTUS

Consulting Engineers

ENGINEERING AND ECONOMIC SURVEYS. ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

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consider their reports. These committees include those on prevention of silicosis through medical control; prevention of silicosis through engineering control; economic, legal, and insurance phases of the silicosis problem; and regulatory and administrative phases. Mining is represented on the committee on economic, legal, and insurance phases of the silicosis problem by Julian D. Conover, secretary, the American Mining Congress.

A meeting of the National Silicosis Conference, similar to that held in April, has been tentatively scheduled for January 14 and 15, 1937. Meanwhile, the committees are endeavoring to compile the extensive data on the various questions of dust disease and dust control which have been submitted to them, and a joint meeting of all committees with the Secretary of Labor will be held in Washington, December 15 and 16.—*A. M. C. Weekly Bulletin Service.*

● WITH two suits already pending in circuit courts seeking to enjoin collection of "windfall" taxes, and 23 pending in Federal district courts, the most important one, from the mining industry's standpoint, was filed in Indiana. There, 35 coal companies filed suit against the collector of internal revenue, seeking to enjoin him from collecting the Government's unjust enrichment tax on moneys received prior to the Supreme Court's invalidation of the Guffey National Bituminous Coal Act. It is the first action aimed directly at collection of "windfall" taxes as a result of operation of the unconstitutional coal act.

The Government contends that the unjust enrichment tax which was enacted to recapture some of the revenue lost by invalidation of the AAA also applies to the 15 percent tax payable under the Guffey Act.

The two suits pending in circuit courts (farthest advanced of all AAA "windfall" actions) are those of the White Packing Co. in the Fourth Circuit (North Carolina) and the Sheridan Flour Mills Co., in the Tenth Circuit (Wyoming). In both cases the Federal District Court dismissed the injunction sought without an opinion. In the former case the Circuit Court granted a temporary injunction pending appeal, while in the latter the appellate court has taken no action. In another case, brought by Kingan & Co., in the Southern District of Indiana (same district where the coal suit was filed this week), the District Court refused the Government's motion to dismiss the complaint. Some twenty-odd other suits are pending in Indiana, Ohio, New York, South Carolina, and Virginia.

● THERE is only one important copper mining district in Germany—namely, the Mansfelder Kupferschieferbezirk (Mansfield Copper District)—which produces 90 percent of the domestic copper. In other parts of Germany copper occurs in certain lead-zinc ore deposits and in some of the iron mines. These mines produce a small tonnage of copper ore concentrate as a secondary product, which goes to make up the balance of the domestic output. Of future importance as a copper producer is the Rammelsberg mine, mentioned under zinc mines. It is estimated that when the new ore treatment plant for the Rammelsberg ore is completed this will yield several thousand tons of copper a year. Among numerous small copper mines in Germany are the Stadtberg mine at Marsberg, Sangerhausen and Richelsdorf in Hessen, the Kupferberg mine at Nipperfuhrt, and the Altenberg mine in the Silesian Mountains, which were productive in the past but have been closed for several years. Interest is again being taken in reopening the first three of these mines, because of Germany's need of copper.

Because of the low price of copper in recent years, the government has had to subsidize the Mansfeld mining company to keep it operating, and thus employ the 9,000 workmen. This subsidy amounted to 10,680,000 marks in 1933, 14,290,000 marks in 1934 and more than 13,000,000 in 1935.

The copper reserves in the developed ore are estimated at 270,000 tons and that in the ore to be developed at 320,000 tons.

Besides the primary copper imports, the copper, brass, and bronze scrap imports aggregated 48,376 tons in 1934 and 62,666 tons in 1935, and 37,415 during first half of 1936.—*Excerpt from "Germany's Capacity to Produce and Consume Metals, Fuels and Minerals," by Chas. Will Wright, U. S. Bureau of Mines.*

COPPER PRODUCTION (Metric tons)

	1932	1933	1934	1935	1936 (6 mo.)
Production:					
From domestic ore	30,700	29,400	26,000	26,800	
From imported ore	20,200	20,400	27,000	29,200	
Net imports	86,300	120,100	168,400	152,200	79,453
Consumption	137,200	169,900	221,400	208,200	
Percent derived from domestic ores	22	17.4	11.7	12.9	

SOURCES OF METAL (In percentages)

	1932	1933	1934	1935
Imports:				
British South Africa	19.6	23.1	25.2	31.1
Chili	13.3	17.5	12.7	22.9
Belgian Congo	13.8	14.6	13.8	16.3
United States	16.3	13.3	27.5	10.8
Yugoslavia	10.7	12	5	7.6

● THE Social Security Board, under date of November 15, released an analysis of state unemployment compensation laws, prepared by R. Gordon Wagenet, director of the Bureau of Unemployment Compensation, and M. G. Murray, chief, Division of Legislative Aid and Approval. In their announcement they say "this analysis contains only the most significant provisions of state unemployment compensation laws as interpreted by Rules and Regulations made by the state agencies administering them. It includes applicable provisions from other state labor laws such as those dealing with public employment offices and the administration of state legislation."

● THE National Association of Purchasing Agents, Inc., through its coal committee reports that stocks of anthracite and bituminous coal in industry in the United States and Canada as of November 1, 1936, amounted to 34,000,000 tons, which is 2-million tons advance from the preceding month and 4 1/3-million tons lower than a year ago.

● DURING the month of October the steel industry added 5,000 employes, which brings the total in industry to over 531,000, an increase of 22 percent in a year. According to the American Iron & Steel Institute, this figure is 15 percent above the 1929 level. Payrolls in the industry in October totalled $71,110,000, which is almost a million dollars above the average monthly payrolls in 1929, and approximately 20-million dollars more than was paid out in October, 1935. Hourly earnings of wage earners during the month averaged 66.3 cents and it is anticipated that the wage increase which went into effect on November 16 will bring the average hourly earnings to about 73 cents an hour. During October wage earners worked an average of 42.5 hours a week which compares with the average of 55 hours per week in 1929.

● **Myron C. Taylor**, chairman of the Board of the U. S. Steel Corporation, was the guest of honor at a dinner on December 3, given by **Dr. Thomas S. Baker**, president emertius of Carnegie Tech. **Richard K. Mellon**, president of the Mellon National Bank, gave a reception at his home for the guests who attended the dinner. In addition to Mr. Taylor and Dr. Baker, the speakers at the dinner included **Frank Howard**, president of the Standard Oil Development Company; **Dr. Albert W. Hull**, assistant director of Research of the General Electric Company, and **Dr. M. A. Stine**, vice president in charge of research of the E. I. du Pont de Nemours & Co.

● THE NATIONAL COAL ASSOCIATION announces the establishment of an engineering department with C. A. Reed as director, who is a combustion and mechanical engineer with experience in the utilization and merchandising of bituminous coal. He comes from Minnesota and more recently has been associated with the Green Engineering Company, of Chicago, which was merged with the Combustion Engineering Corporation. Recently he has been employed by the Pittsburgh Coal Company as director of engineering and technical sales promotion.

—*Personals*—

Roy Carson, formerly traffic manager of Appalachian Coals, Inc., has accepted a similar position with the Harlan, Hazard and Southern Appalachian Coal Operators' Association, with headquarters at Louisville, Ky.

H. N. Lawrie prepared the gold and silver section of "The Mineral Industry," which is filled with pertinent information relating to this group. Copies may be had by addressing Mr. Lawrie at 3102 Thirty-third Place, N. W., Washington, D. C.

H. Foster Bain, mining geologist, distinguished engineer, and former director of the United States Bureau of Mines and secretary of the American Institute of Mining and Metallurgical Engineers, has established offices at 17 Battery Place, New York City.

Lawrence B. Wright and **Samuel H. Dolbear** announce the organization of the firm of Wright, Dolbear & Company, Ltd., consulting mining engineers and geologists, with offices at 17 Battery Place, New York City.

C. W. Waterman, of the McNally-Pittsburg Company, has been spending several weeks' vacation at White Sulphur Springs.

Ernest N. Wigton, vice president of the Morrisdale Coal Company, was recently elected commodore of the Huntington Yacht Club.

W. J. Jenks has been named president of the Norfolk and Western Railroad Company.

J. S. Allison, Jr., has joined the staff of Babcock and Wilcox Company as district manager of the Chicago territory.

R. H. Dunham, president of the Hercules Powder Company, has announced that this company will acquire the assets of the Paper Makers' Chemical Corporation. **W. J. Lawrence,** formerly president of this company, has been elected a vice president of Hercules Powder Company.

W. J. Jenkins

W. J. Jenkins, president of the Consolidated Coal Company, has been reelected president of the Illinois Coal Operators' Association.

S. J. Dickenson has been elected president of the Harlan County Coal Operators Association.

W. G. Polk has been re-elected president of the Southern Appalachian Coal Operators Association.

Arthur Notman, consulting engineer, New York City, will return to his office sometime in December from a trip to Africa where he has been for several months.

James S. Douglas, president of the United Verde Extension Mining Company, has returned to this country after an extended stay in France.

George B. Harrington, president of the Chicago, Wilmington & Franklin Coal Company, has been elected a director-at-large of the National Coal Association.

James H. Pierce, of Scranton, has announced that effective November 27, he has disposed of his stock interest in the Wyoming Valley Collieries Company which operates the Harry E and Forty Fort mines at Swoyersville, Pa., and has resigned as vice president, treasurer and director of this company. Mr. Pierce announces also that he has resigned as vice president and director of the Wyoming-Shamokin Coal Sales Company, the affiliated sales agency of the Wyoming Valley Collieries Company.

C. W. Gibbs, general manager of the Harwick Coal Company, of Pittsburgh, was chosen as general chairman of the Mining Section of the National Safety Council for 1937 at its annual meeting held at Atlantic City.

A. W. Dickinson represented the American Mining Congress at the Forty-second Annual Convention of the Northwest Mining Association at Spokane, December 3, 4, and 5, 1936. **Harold H. Neff** and **F. W. Boericke,** of the staff of the Securities and Exchange Commission, also attended the convention and conferred with northwestern mining men concerning the new registration forms prepared by the SEC.

Waldemar T. Schaller was recently elected chairman of the Washington, D. C. Section of the American Institute of Mining and Metallurgical Engineers. **Julian D. Conover** was elected vice chairman for the District of Columbia; **James H. Morley,** vice chairman for Virginia; **U. C. Tainton,** vice chairman for Maryland; and **Robert H. Ridgway,** secretary-treasurer.

Frank Eichelberger, manager for the Callahan Lead-Zinc Company, has started an active development program at his company's property in Idaho.

Harlan A. Walker was recently appointed assistant general manager of El Potosi Mining Company, which is a subsidiary of Howe Sound Company.

Dr. W. S. Landis, of the American Cyanamid Company, was awarded the Chemical Industry Medal for 1936 at a joint meeting of the Society of Chemical Industry and the American Chemical Society, at the Chemists' Club in New York City.

Dr. Charles Camsell has been appointed deputy minister of the recently organized Federal Department of Mines and Natural Resource of the Dominion of Canada.

H. W. Gould, San Francisco, who recently made an examination of a new quicksilver discovery in British Columbia for the Manitou Mining Company, has recommended that sufficient ore has been developed to justify the building of a plant.

Frank L. Hess, noted rare minerals expert of the Bureau of Mines, spent a month's vacation in the Black Hills of South Dakota.

Morrison Shafroth, of Denver, was recently appointed by the President as assistant general counsel of the Treasury Department for the Bureau of Internal Revenue. This fills the vacancy caused by the resignation of **R. H. Jackson,** who became Assistant Attorney General. Mr. Shafroth is the son of the late famous John F. Shafroth, twice Governor of the state of Colorado and for several years United States Senator from that state.

J. J. Lillie recently became manager of the Mountain City Copper Company, which is affiliated with the International Smelting and Refining Company, with headquarters at Salt Lake City, Utah.

Effective November 1, 1936, **James A. Long** was named assistant general sales manager of the Macwhyte Company, at Kenosha, Wis.

C. A. Cabell, president of the Carbon Fuel Company, was reelected president of the Kanawha Coal Operators' Association.

John F. Daniel was recently reappointed chief of the Division of Mines and Minerals for the state of Kentucky.

Harry E. Moran recently was elected president of the C. H. Mead Coal Company.

T. J. O'Brien has been elected president of the Southern Wyoming Coal Operators' Association.

N. P. Rhinehart has been elected president of the West Virginia Coal Mining Institute.

A. D. Carlton, president of the American Wholesale Coal Association, and affiliated with the Cleveland-Cliffs Iron Company, recently addressed the Illinois Reciprocal Trade Association.

G. B. Cushing was recently appointed manager of sales promotion for the A. M. Byers Company, of Pittsburgh, Pa.

—*Died*—

James T. Skelly, vice president and director, Hercules Powder Company, died on October 31, 1936, following an illness of six weeks. He probably was the best known man in the explosives-consuming industries, not only because of his 44 years of service, but because of his great capacity for making friends. As chairman of the finance committee and member of the executive committee, he served his company with notable distinction and aided immeasurably in the development of Hercules from its inception in 1913 as an explosives company to its present position in the chemical industry.

John C. Daigen, lubricating engineer of The Universal Lubricating Company, died suddenly on November 11, 1936, at his residence in Painesville, Ohio. Mr. Daigen was well known in the industry, among the mechanical departments. He was with The Universal Lubricating Company for 23 years, and prior to that time he was master mechanic for the Cleveland & Eastern Traction Company.

BOOK REVIEWS

CYANIDATION AND CONCENTRATION OF GOLD AND SILVER ORES, by John Van Nostrand Dorr; 485 pages. McGraw-Hill Book Co., New York, 1936; price, $5.

This book, which metallurgists throughout the world knew was being prepared since 1934, and who needed an up-to-date text on the art of cyanidation, is well fitted to be among the 32 books covering the process since 1894 and listed in that by J. V. N. Dorr. The scope of the new work is world-wide, so reviewers in other countries cannot say that it refers only to American practice; in fact, cyanidation in distant lands receives a goodly share of space, which is as it should be. MacArthur and the brothers Forrest, who originated the cyanide process for gold extraction and have passed on, would feel gratified that the principles of the process are now as they presented them, the changes since being mainly mechanical and efforts to rid the pulp of coarse gold and of sulphides prior to cyanidation.

For a book of this class, careful and fairly close indexing is important, and we here find 30 pages of references, equivalent to one-sixteenth of the whole.

To the operator or to the metallurgist at small or big mines we commend the 139 pages of chapter 12 and the 7 pages of chapter 13. Respectively, these cover the treatment of simple and complex gold and silver ores and the treatment of old residues. If an ore is merely free-milling, or contains graphite or tellurides or pyrrhotite or arsenopyrite or gold in copper or silver in manganese, or the residues are merely sand or slime or mixed, these chapters tell, with flow-sheets and total costs, how such ores and tailings are treated. And following in chapter 14 are details of what it costs to do this, including power.

Chapter I is historical, but we fail to understand why 10 pages of J. J. Croston's and other statistics of gold and silver production are included. If they revealed the proportion of these metals extracted by cyanide, that would be of interest. Likewise, in Chapter 14, are four pages of costs, but they are not treatment costs.

The examination and testing of ore and plant control—chapters 2 and 11—are vital phases in the successful treatment of gold and silver ores, so here we find the problems adequately handled—sampling, microscopy, pH, laboratory cyanidation and flotation, the cyanides, dissolution of gold and the role of oxygen, regeneration of cyanide, lead salts and lead minerals, and sieves.

Instead of searching for methods of bullion recovery, we find it all collected in the 49 pages of chapter 10. Here are described the working of the unit flotation cell, amalgamation practice, the use of corduroy, precipitation on zinc dust or filament, and how to clean up—melting, refining, and sampling for assay.

Few millmen realize how important it is to determine whether an ore is adaptable to sorting; some ores are and some are not; so chapter 4 tells how it is done, the cost, and the benefits.

There are complete chapters on coarse crushing, on fine grinding and classification, and on the treatment of sand and slime as individual products or of an all-slime plant. The latter includes all types of filters and counter-current decantation.

Practically nothing is given on the movement of ore, wet and dry pulp, and solutions. Conveyors (belt, drag, and screw), launders, elevators, air-lifts, and pumps are vital in a flow-sheet and should have had a chapter.

Rightly, no stress is laid on whether flotation alone or cyanidation alone, or both, should be adapted to an ore. There has been too much a follow-the-leader, especially with flotation, in some districts. Chapter 9, of 28 pages, covers the concentration of ores and the treatment of concentrates, as practised. Gravity tables and flotation machines with their reagents are amply described, followed by the raw and roasting treatment of concentrates.

We note a few typographical errors, one of them being T. A. Rickard's name, on page 453. All references to previous writings are part of the running text, a style we rather prefer. A good feature is the uniformity and clarity of all the flow-sheets.

A detailed picture of the art of cyanidation as practised today in the chief mining districts of the world.

GOLD EXTRACTION; 62 pages. Imperial Chemical Industries Limited, London, S. W. 1, England, 1936; free.

Here is a handy and useful pocket book of notes on cyanidation suitable for the small operator in any country. Imperial Chemical Industries is a British organization of wide interests and now controls the Cassell Cyanide Company, which make cyanide and has 52 years of experience in the treatment of gold and silver ores. No such booklet on cyanidation has ever been published, and we recommend it to anyone running or about to run a small plant, also to students. It answers every question regarding the stamp-crushing of ores (ball-milling is not covered), amalgamation and use of corduroy or blankets, concentration and treatment of concentrates, leaching ore with cyanide solutions, precipitation and clean-up of the gold and silver, how to test solutions, all about cyanide, difficulties that may arise, flotation, and useful information, including a table of all the common minerals. We appreciate the utility of this booklet, which may be used as a companion to any of the several books on prospecting.

The Manufacturers Viewpoint

● THE DAVIS EMERGENCY EQUIPMENT COMPANY, Inc., recently released a folder descriptive of the McDonald safety hat for use in mine workings. Copies of the bulletin are available by addressing the company at any of its offices in Chicago, New York City, and Houston, Tex..

● FULL commercial production of a new kind of galvanized sheet that assures a good paint bond on iron and steel products has been announced by The American Rolling Mill Company, of Middletown, Ohio. Introduction of "Armco Galvanized Paintgrip" sheets follows several years of intensive research on the part of Armco's metallurgists and the technicians of the Parker Rust-Proof Company. This new kind of galvanized sheet metal can be painted without special treatment of the surface by the user.

● A NEW line of 15,000-volt oil circuit breakers, utilizing the oil-blast principle and incorporating a simpler operating mechanism, simpler internal mechanism and fewer bearing points, has been announced by the General Electric Company. The new breakers are identified as Types FLO-1A, FLO-1B, and FLO-1C. The interrupting ratings are 50,000-, 100,000-, and 175,000-kva respectively.

● AN IMPROVED rod straightener and shear machine is announced by The American Foundry Equipment Co., 555 South Byrkit Street, Mishawaka, Ind. The American rod straightener and shearer was designed for reclamation of rods, bolts, wire, and nails. It is said that it will reduce scrap piles, save labor and materials, and pay profits through salvaged materials which formerly constituted waste; and that laborers formerly occupied in straightening rods by hand can be put to more profitable work in other capacities.

● A NEW low-cost Nofuze panelboard for general 115-, 115/230-volt a.-c. distribution with branch circuits ranging from 15 to 50 amperes capacity and selling for approximately two-thirds the price of previous circuit-breaker type panelboards is announced by Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

● A BULLETIN describing a new line of fully bronze-bushed standard iron-body wedge gate valves has just been published by The Kennedy Valve Manufacturing Company. This folder contains large sectional views of these valves, with references to 33 outstanding features of design, and describes the valves in detail.

Copies of the bulletin may be obtained by addressing The Kennedy Valve Manufacturing Company, Elmira, N. Y., and asking for Bulletin 47.

● THE Babcock & Wilcox Tube Co., Beaver Falls, Pa., announces the appointment of Mr. W. W. Williams, formerly general sales manager, as general manager of the company, and Mr. T. F. Thornton, formerly sales manager of the Detroit office district, as general sales manager.

● THE story of the use of alloy steels in boilers, valves, steam turbines, and in other power-plant applications were illustrated by Electro Metallurgical Co., a unit of Union Carbide & Carbon Corporation, at Booth 25 of the National Exposition of Power and Mechanical Engineering, held in Grand Central Palace, New York City, from November 30 to December 6. The superior creep strength of alloy steels in contrast to plain carbon steels was depicted in an interesting manner. All this was accompanied by physical and chemical test specimens showing the value of alloy steel under various conditions of temperature, pressure, and corrosion.

● EFFECTIVE November 1, John W. White, formerly managing director of the Cia. Westinghouse Electric Internacional, S. A., with headquarters at Buenos Aires, Argentina, was appointed general manager of the Westinghouse Electric International Co.

● A NEW eight-page bulletin illustrating and describing the improved Mixflo centrifugal pump has been issued by the Worthington Pump & Machinery Corp., Harrison, N. J. The Mixflo, in sizes from 12 to 84 in., delivers from 1,000 to 225,000 gal. per minute at heads from 5 to 50 ft. It is widely used for irrigation, drainage, sewage disposal and condenser circulation service. Photographs, sectional drawings and dimension tables are included in the bulletin. It contains a complete description of the parts of the pumps, together with technical information concerning modern trends in hydraulic design. A copy of the bulletin, W-313-B1, may be obtained by request to the manufacturer.

● THE National Electrical Manufacturers' Association announces the publication of the NEMA Electric Arc-Welding Machine Standards, Publication No. 36-37. This new publication is a reference work of practical information concerning the manufacture, test and performance of direct-current and alternating-current arc-welding machines, such as motor generator sets, dynamotors, transformers, and rectifier arc-welding units. Because these standards represent standardized practice in the United States, they will assist in harmonizing practices in the industry and promote production economies. They also clear up many troublesome problems for the buyer of arc-welding equipment, and define numerous terms which have hitherto been subject to various interpretations. Copies of the 20-page publication may be obtained from the National Electrical Manufacturers' Association, 155 East Forty-fourth Street, New York City, at 50 cents per copy.

● H. S. COVER, South Bend, Ind., announces a newly improved Dupor plate respirator. It is called Bulb Valve Type No. 24, and has been approved by the United States Bureau of Mines. Their statement indicates that this new construction principle not only assures a larger filter area for easier breathing, but greater comfort to the wearer because of unobstructed vision and extremely light weight.

● ANNOUNCEMENT is made by Link-Belt Co., Chicago, of the appointment of Mr. P. B. Engstrom as the company's authorized distributor for crawler shovels, draglines and cranes, also locomotive cranes, in Los Angeles and southern California territory. He is making his headquarters at the Link-Belt office in Los Angeles, 361-369 South Anderson Street.

● AMONG the new coal preparation plants and coal preparation facilities are the Hanna Coal Company, at their Dun Glen properties, who have given the Morrow Manufacturing Company an order for a four-track tipple with a capacity of 250 tons per hour. The plant includes a Link-Belt Simon-Carves coal washing plant; the Knife River Coal Mining Company, which is building a modern all-steel four-track plant; and Cox Bros. & Company, Inc., who are installing Deister-Overstrom coal washing tables.

● INGERSOLL-RAND has just released a comprehensive booklet on "The most up-to-date line of air and electric hoists for mine service," which gives complete information both pictorially and through text matter of this company's line. Copies may be obtained by addressing them at 11 Broadway, New York City.

● UNDER the title "You Be the Judge—After Reading the Attached Testimony," the Electric Storage Battery Co., Philadelphia, has issued a collection of testimonial letters from users of Exide-Ironclad batteries. The writers of the letters include foundries, smelters, manufacturers, ice and coal companies, mine owners, express companies, and others, including a society for the prevention of cruelty to animals. The letters are reproduced in actual size and are bound in a manuscript type of cover, but with the full side on the front instead of the back.

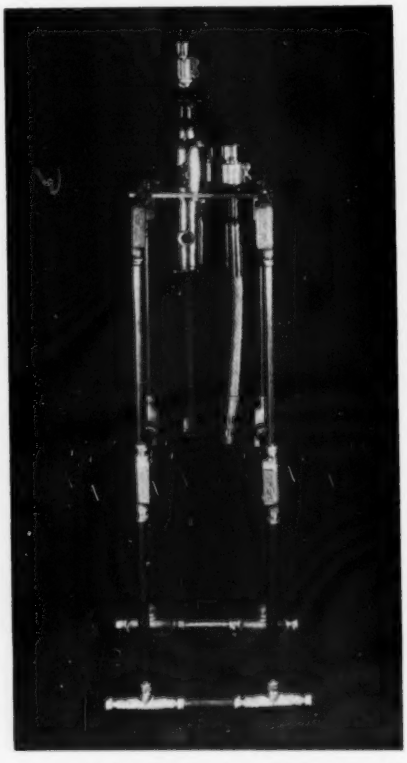
● THE TANNER TANK air line antifreeze system which absolutely eliminates air line and air tool freezing, has recently been improved. This system is harmless, odorless and non-explosive. It will not injure metal, hose or lubrication. Tanner tanks are built to A. S. M. E. specifications of welded construction for 200 pounds working pressure and are easily installed. Write for bulletin to Sullivan Machinery Company, Michigan City, Ind.

● ROOTS-CONNERSVILLE BLOWER CORP., of Connersville, Ind., has just issued Bulletin 260-B11B, descriptive of its line of Type "T" turbine pumps, which have been on the market several years; and while the basic operating principle remains the same, numerous refinements have been included to provide for increased durability and improved performance. A line of self-priming pumps, particularly well suited for handling volatile liquids, is now being developed.

● WITH the establishment of a research department, strictly for use of industries, by the Productive Equipment Corporation, 4600 South Kedize, Chicago, comes a new service in the art of screening. This laboratory performs this service free to all industries, filling a gap for those who do not maintain their own laboratory.

Vibrating screens were invented and developed since the World War, and the new applications for screens has led to the handling of an enormously diversified number of products.

● A 5 PERCENT bonus in the form of additional compensation for all its employes has been announced by the Stearns Magnetic Manufacturing Co., Milwaukee, Wis. Each employe will receive 5 percent of all money earned during the period between October 1, 1935, and September 30, 1936. The Stearns Co. manufactures a varied line of magnetic separators, magnetic clutches, brakes, clutch-brake units, suspension and safety magnets, and other magnetic devices.



Bore Hole Suspension Unit of the Anaconda Wire & Cable Company

● A NEW publication, entitled Types SH and DH Speed Reducers, has recently been issued by the Westinghouse Electric & Manufacturing Co. Describing single and double reduction units of the single helical gear type with antifriction bearings and splash lubrication, for application in general industrial and mining operations, the booklet describes the construction, design, efficiency, and ratings of these gear units. Also included are available speed ratios, methods for selecting the proper reducer and horsepower ratings in accordance with the American Gear Manufacturers' Association. Copies of the publication are available from the nearest district office, or direct from the advertising department, East Pittsburgh, Pa.

● COMPLETE information about the American line of flasks and jackets is contained in Booklet No. 551 and will be sent by the American Foundry Equipment Co., 555 South Byrkit Street, Mishawaka, Ind., to anyone writing for copy. Pertinent information is given on featherweight (Dow-metal) flasks, aluminum flasks, steel plate pouring jackets, flexible aluminum pouring jackets, and flexible cast-iron pouring jackets. The information contained in this booklet is brief but very informative.

● A VERY interesting four-page bulletin, No. 2231, describes the "COROC" diamond drill, an Ingersoll-Rand product. This drill is equipped with a master gauge that registers directly in pounds the pressure of the diamond bit against the rock. Thus, when a soft formation or seam is encountered during drilling, an immediate reaction is indicated on the gauge. The hydraulic control mechanism permits the drill, under such conditions, to accelerate its feed. but does not allow the string of tools to drop. The "COROC" diamond drill can be operated by gasoline or kerosene engine or electric motor drive. Hoisting of the tools is facilitated by an integral hoist particularly suited to this type of work.

Holes to 1,150 ft. producing cores ⅞ in. in diameter, or shorter holes with larger cores, up to 3-in. diameter are possible.

A copy of Bulletin No. 2231 may be obtained from Ingersoll-Rand, 11 Broadway, New York City, or any branch office.

● THE S. O. Otrich Co., 119 New Montgomery Street, San Francisco, Calif., has been appointed sales representative by the Stearns Magnetic Manufacturing Co., Milwaukee, Wis. This company has also opened a sales office in Philadelphia, with James Whiting in charge of headquarters at 369 Architects Building.

Application of Magnetic Surveying to Exploration

(*Continued from page* 26)

tions with those of unknown and hidden formations may often yield valuable information in advance of drilling. This type of approach should be valuable in interpreting other magnetics than those connected with iron formations. It is a question whether the full effectiveness of this comparative method of interpretation is not sometimes overlooked.

THEY MUST GIVE *Satisfaction*

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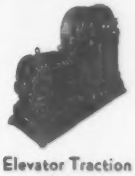

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● BEGINNING October 19, and lasting six weeks, more than 34,800 employes in 15 cities where plants of Westinghouse Electric and Manufacturing Company are located, will launch a gigantic Golden Jubilee "Sell-Ebration." This "Sell-Ebration" will not only help increase the company's sales but will also acquaint employes' friends and neighbors with the new complete line of golden jubilee electrical appliances. The campaign is a grand finale to the Westinghouse fiftieth anniversary year. The employes' pledge to "sell more than one appliance each during the campaign" reveals their enthusiasm and their determination to obtain approximately $2,000,000 worth of plus business from this campaign. Every employe is assigned to a team, each team has a captain and lieutenants, who reports to a department manager and those in turn, to the campaign manager, C. B. Auel. Executives of the company have the same rating as any other employe in this "Sell-Ebration" campaign and will personally sell appliances during the six-week period.

● AN improved line of single horizontal three-stage compressors for pressures from 750 to 2,500 pounds is now offered by Worthington Pump and Machinery Corporation, Harrison, N. J. The compressor is applicable for high air pressure for any purpose, also for the compression of oxygen, hydrogen, helium and other special gases as well as refinery gas or straight natural gas. Double-row tapered-roller bearings, automatic self-oiling frames with oil-tight covers, Worthington Feather and ring plate valves, and efficient inter-cooling between stages are features of this improved line of compressors. A choice of steam or motor drive is offered on all sizes. Bulletin L-611-B12, obtainable upon request to the manufacturer, shows a sectional view of a compressor and gives detailed specifications.

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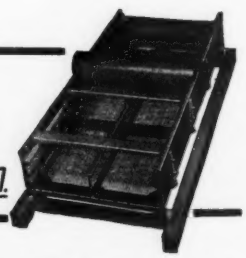

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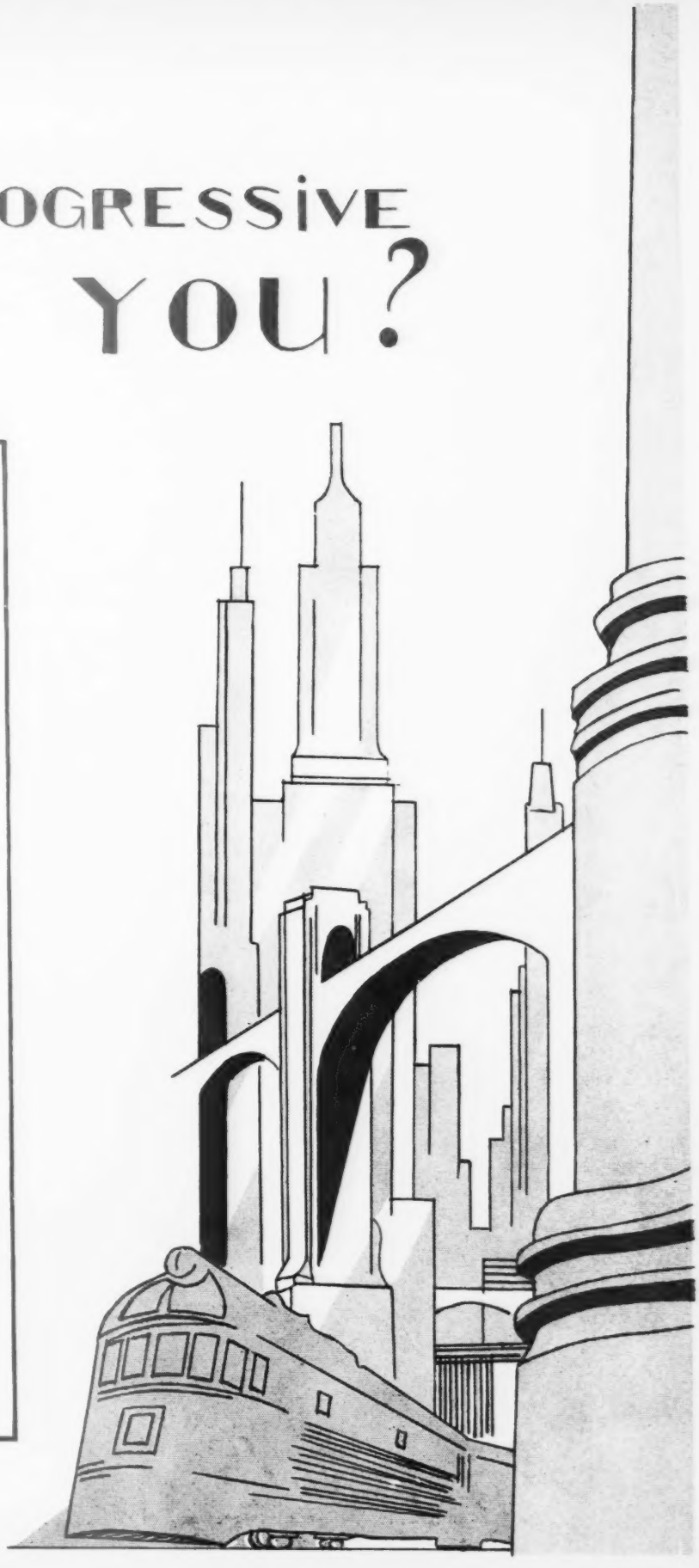

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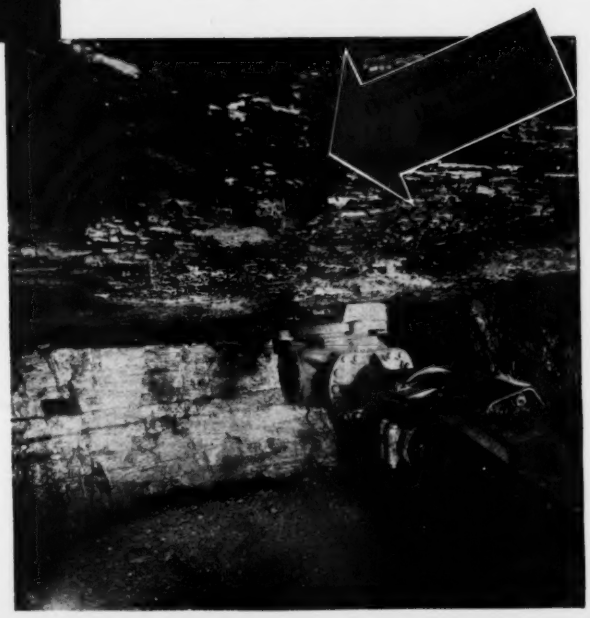

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